- **1 - Introduction**
- **2 Troubleshooting**
- **3 - Parts Lists**
- **4 - Removal & Replacement**
- **5 - Verification Procedures**

CELL-DYN® 3200 SYSTEM
SERVICE MANUAL
Part Number 9140300

1 - Introduction

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1.1 Proprietary Information

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This service manual was developed to be used by trained Abbott Laboratories Field Service Personnel. The revision status of this manual is the responsibility of the manual holder.

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1.2 Revision Log

The Revision Status of this manual is indicated below. Be sure that the manual contains the latest revision number of all pages.

Table 1-1 Revision Log

Revision	Date	Pages Revised/Added	TSBs Incorporated	ISAs Incorporated
A	August	Complete Revision	109 - 001A, 003	109 - 003, 004, 005, 006

1.3 About This Manual

Introduction

This Service Manual contains the information necessary to align, troubleshoot, repair, and maintain the CELL-DYN 3200 Automated Hematology System.

Service Manual Section Descriptions

The manual is composed of five sections. The following are descriptions of the contents of each of the sections.

Section 1: Introduction

This section contains an introduction to the system, information on the use of the manual, warranty information, safety considerations, hematology parameters, and system specifications.

Section 2: Troubleshooting

This section contains procedures to be used by the FSR in identifying and isolating problems. The procedures are presented in a flowchart format and are accompanied by illustrations for added clarity. A detailed explanation of the use of the flowcharts is given at the beginning of the section.

Section 3: Parts Lists

This section contains parts lists and graphics showing the locations of FRUs. This section is used by the FSR in conjunction with Troubleshooting and Removal & Replacement.

Section 4: Removal & Replacement

This section contains the procedures to be used by the FSR for the removal and replacement of subassemblies and components. The procedures are presented in a paragraph format and are accompanied by illustrations for added clarity.

Section 5: Verification Procedures

This section contains procedures that enable the FSR to verify the integrity of various instrument functions. These procedures may be used to facilitate troubleshooting, or be dictated by Troubleshooting and Removal and Replacement.

This section also contains procedures such as adjustments, alignments, and calibrations used to ensure proper instrument performance. These procedures may be performed on a routine maintenance basis, or be dictated by Removal and Replacement.

1.4 CELL-DYN 3200 Operator's Manual

Operating instructions and routine maintenance procedures for the CELL-DYN 3200 are included in the Operator's Manual provided with each system. It is essential that the service engineer read and understand the Operator's Manual, and be able to correctly perform all routine operating functions before attempting to troubleshoot and repair the system.

1.5 Warranty Information

Components comprising the CELL-DYN 3200 System have been designed by Abbott Laboratories for optimal performance. Substitution of reagents, accessories, or system components may adversely affect performance and may invalidate any warranty agreements.

Abbott Laboratories cannot accept responsibility for any clinical results produced by use of reagents, calibrators, controls, equipment, or supplies either not manufactured by or not approved by Abbott Laboratories.

1.6 System Introduction

Each CELL-DYN 3200 System may be comprised of three or four major hardware components: Analyzer, Video Display, Keyboard, and optional Sample Loader.

The CELL-DYN 3200 Hematology System

When approaching a hematology system from a service perspective, the word “system” must be emphasized because there are both “internal components” (system hardware and software) and “external components” (reagents, controls, etc.) that comprise the complete system. The Service Representative must realize that both of these types of components can adversely affect overall system performance. Therefore, it follows that all external components and conditions such as reagents, environment, integrity of samples and controls be checked and verified as correct before performing service on the internal components. In the investigation of any non-specific or data related complaint, the system hardware and software should be the last components of the system to be suspected as the cause of the problem.

System External Components

The following is a list of the CELL-DYN 3200 external components and conditions:

- Operator Technique (Maintenance)
- System Reagents
  - Isotonic Diluent
  - Diluent/Sheath
  - Hemoglobin Lyse
  - WBC Lyse
- System Controls & Calibrators
  - CELL-DYN 3200 Whole Blood Control
  - OPTI-CAL
  - Latex Beads
- Whole Blood Specimens
- System Environmental Integrity (Temperature, RFI, ESD)
- Power Line Integrity

System Internal Components

The following is a list of the CELL-DYN 3200 internal components:

- CELL-DYN 3200 System Components
  - Flow Panel
  - Optics Bench
  - Power Supplies
  - Measurement Electronics
  - Computer Electronics
  - A/D & D/A Electronics
  - Air Supply
  - Personal Computer Module
  - Tube Manipulation Hardware

1.7 Safety

Operation, maintenance, and servicing of hematology systems may expose individuals to potential safety and health hazards. All work must be performed in accordance with procedures described in the Abbott Operator's and Service Manuals, or as directed by an Abbott Technical Support Representative.

Warnings are inserted in this manual to alert personnel to potential hazards. The standard warning conventions including signal words (e.g. Caution) and symbols are described below.

Signal Words and Graphic Warning Conventions

Signal Words

DANGER: Denotes an immediate hazard which, if not avoided, could result in serious injury or death. This signal word represents the highest level of any hazardous situation.

WARNING: Denotes a hazard which, if not avoided, could result in moderate to serious injury.

CAUTION: Denotes potential hazards that could result in minor injury. Also, used for conditions or activities that could threaten equipment performance.

Graphic Conventions

The general hazard icon identifies an activity or area that may present a hazard to personnel or equipment.

The electrical hazard icon alerts personnel to the possibility of electrical shock if procedural or engineering controls are not observed.

The biohazard icon identifies an activity or area where personnel may be exposed to infectious substances.

The laser hazard icon identifies an activity or area where personnel will be exposed to an eye hazard if procedural or engineering controls are not observed.

The electrostatic discharge icon identifies an activity or area where personnel must wear a ground strap while servicing the system.

Biosafety

WARNING: POTENTIAL BIOHAZARD Consider all clinical specimens, reagent controls, surfaces, or components that contain or have contacted human blood or serum as potentially infectious. Wear gloves, lab coats and safety glasses, and follow other biosafety practices as specified in the OSHA Bloodborne Pathogen Rule (29CFR Part 1910.1030) or other equivalent biosafety procedures.

WARNING: POTENTIAL BIOHAZARD The aspiration needle/probe is sharp and potentially contaminated with infectious materials. Avoid contact with the tip of the needle/probe.

Clean-up spills of potentially infectious materials in accordance with established biosafety practices. A generally accepted procedure for cleaning such spills is to absorb the spill with toweling or other absorbent material, wipe the area with a detergent solution, and then wipe the area with an appropriate tuberculocidal disinfectant such as 10% chlorine bleach solution.

Prior to service or maintenance, the instrument should be decontaminated in accordance with the following:

a. Remove and dispose of contaminated disposables in a regulated medical waste container.

b. Clean and decontaminate the exterior of the instrument using a detergent solution followed by a 10% chlorine bleach solution or other tuberculocidal disinfectant. Flush the fluid pathway with chlorine bleach solution as specified in the Operator's Manual.

Dispose of waste in accordance with local, state and federal regulations. Probes, needles, broken glass, slides, and other sharps that are contaminated with potentially infectious substances should be collected in a "sharps" container for disposal as regulated medical waste. Contaminated gloves, wipes, and other disposables should be placed in a standard medical waste container.

Electrical Safety

WARNING: ELECTRICAL HAZARD When the instrument is powered and protective covers are removed, there are exposed electrical systems that could startle or seriously injure personnel upon contact. Use appropriate safety precautions to prevent body and/or tool contact with live electrical components, especially power supplies.

Laser Safety

DANGER: LASER LIGHT Avoid direct exposure to beam. Do not look directly into the laser beam or any reflection of the beam from a mirror-like surface. When the access door, instrument top cover, or other inner protective cover is removed, (Helium-Neon) laser power up to 10 mW continuous wave at 632.8 nm in a beam with 1 mR divergence could be accessible in the interior of the optics bench. This amount of energy, with insignificant attenuation with distance, is sufficient to cause eye damage.

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure. If the instrument is used or modified in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired.

The Class 1 Laser Product Label (Abbott PN 9230702A) is shown below (Figure 1-1). The label consists of black lettering against a white background. The label is located on the backside of the instrument and positioned at a clearly visible location.

The inner protective cover laser warning labels must not be removed and are to remain legible. The protective housing label (Abbott PN 9230701D) is shown in Figure 1-2. The label consists of black lettering against a yellow background and appears on the protective cover within the optics bench and on the flow panel (see Figure 1-3 and Figure 1-4).

32109

Figure 1-1 Laser Product Label (PN 9230702A)

Figure 1-2 Laser Warning Label (PN9230702D)

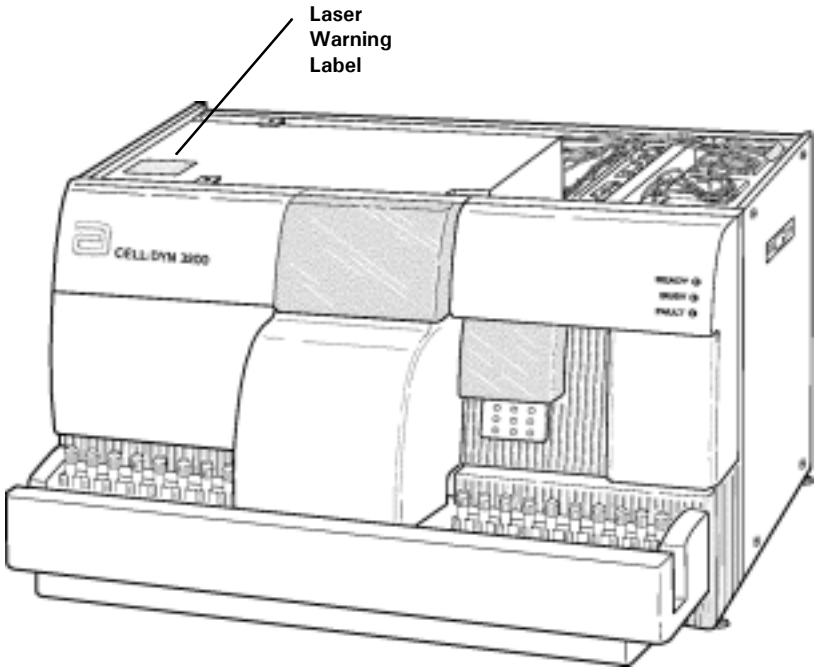

Figure 1-3 Top Laser Warning Label Location

For beam alignment and other open beam configurations, follow instructions provided by the Service Manual, Advisories, and Bulletins regarding the requirement for using laser safety eyewear. If required, assure laser eyewear are not damaged and have an optical density of 1- 2 at a wavelength of 632.8 nm. During open beam configurations, assure that the beam is confined to the laser bench area and only personnel with proper eye protection are present.

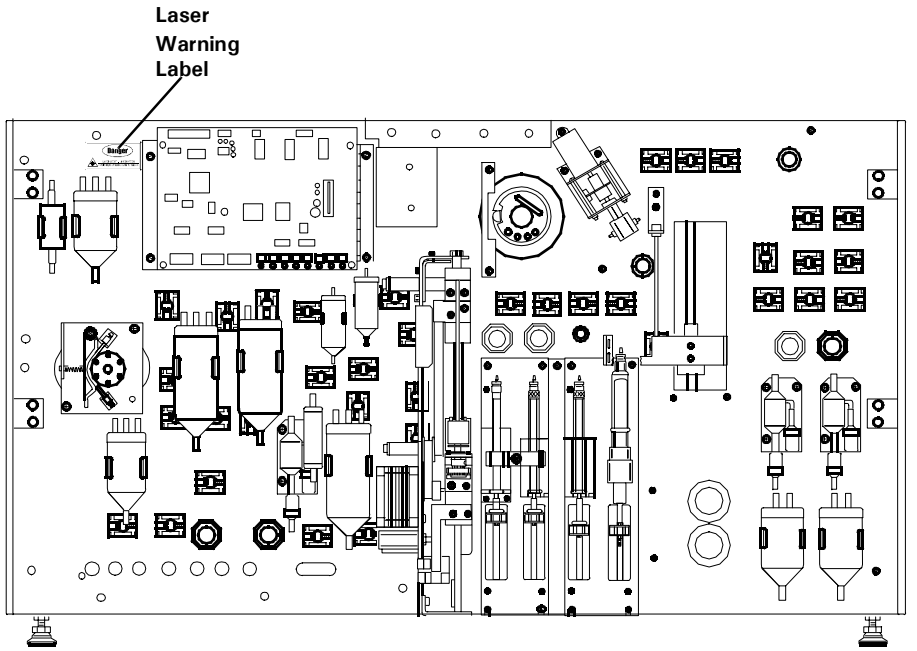

Figure 1-4 Front Laser Warning Label Location

1.8 CELL-DYN 3200 Hematology Parameters

The following tables list the CELL-DYN 3200 Hematology Parameters and their abbreviations.

Table 1-2 Red Cell Parameters

Full Name	Abbreviation
Red Blood Cell Concentration	RBC
Hemoglobin Concentration	HGB
Hematocrit	HCT
Mean Cell Volume	MCV
Mean Cell Hemoglobin	MCH
Mean Cell Hemoglobin Concentration	MCHC
Red Cell Distribution Width	RDW

Table 1-3 White Cell Parameters

Full Name	Abbreviation
White Blood Cell Concentration	WBC
Neutrophil Concentration	NEU
Neutrophil Percentage	%N
Lymphocyte Concentration	LYM
Lymphocyte Percentage	%L
Monocyte Concentration	MONO
Monocyte Percentage	%M
Eosinophil Concentration	EOS

Table 1-3 White Cell Parameters (Continued)

Full Name	Abbreviation
Eosinophil Percentage	%E
Basophil Concentration	BASO
Basophil Percentage	%B

Table 1-4 Platelet Parameters

Full Name	Abbreviation
Platelet Concentration	PLT
Mean Platelet Volume	MPV
Platelet-crit	PCT*
Platelet Distribution Width	PDW*

* Clinical significance has not been established for these parameters. Therefore they are not reportable in the US. They are provided for laboratory use only.

1.9 System Specifications

The following tables contain the specification for the CELL-DYN 3200 System.

Table 1-5 Physical Specifications (Unpackaged)

	CS Model	SL Model	Graphics Printer
Height	19.0” (48.2 cm)	19.0” (48.2 cm)	7.2” (18.3 cm)
Width	32.8” (83.3 cm)	32.8” (83.3 cm)	16.1” (40.9 cm)
Depth	23.3” (59.2 cm)	29.3” (74.4 cm)	9.9” (25.1 cm)
Weight	214 lb (97.3 kg)	232 lb (105.5 kg)	9.9 lb (4.5 kg)

Table 1-6 Physical Specifications (Packaged)

	CS Model	SL Model	Graphics Printer
Height	38” (96.5 cm)	38” (96.5 cm)	12” (30.5 cm)
Width	34” (86.3 cm)	34” (86.3 cm)	19.5“ (49.5 cm)
Depth	31” (78.7 cm)	31” (78.7 cm)	14.8” (37.6 cm)
Weight	255 lb (116 kg)	273 lb (124 kg)	16.4 lb (7.4 kg)

Table 1-7 Analyzer Input Requirements

Module	Voltage	Frequency	Max Current
Analyzer	110 VAC ± 10 %	50/60 ± 3 Hz	6 amps
	120 VAC ± 10 %	50/60 ± 3 Hz	6 amps
	220 VAC ± 10 %	50/60 ± 3 Hz	3 amps
	240 VAC ± 10 %	50/60 ± 3 Hz	3 amps
Analyzer & Sample Loader	110 VAC ± 10 %	50/60 ± 3 Hz	6 amps
	120 VAC ± 10 %	50/60 ± 3 Hz	6 amps
	220 VAC ± 10 %	50/60 ± 3 Hz	3 amps
	240 VAC ± 10 %	50/60 ± 3 Hz	3 amps
Monitor	100 - 240 VAC	50/60	1.3 amps
Printer	120 VAC ± 10% 220 - 260 VAC	50/60	0.5 amps

Table 1-8 Performance Specifications

	Background	Precision	Correlation	Linear Range
WOC	≤ 0.10K/µL	≤ 2.7%	≥ 0.99	0.0-250 K/µL
NOC	≤0.10 K/µL	2.7%	≥ 0.99	0.0-250 K/µL
RBC	≤ 0.20 M/µL	≤ 1.5%	≥ 0.98	0.0-8.0 M/µL
HGB	≤ 0.1g/dl	≤ 1.0%	≥ 0.98	0.0-25.0g/dL
MCV	N/A	≤ 1.0%	≥ 0.98	35-180 fL
RDW	N/A	≤ 5.0%	≥ 0.91	N/A
PLT	≤5.0K/µL	≤ 4.0%	≥ 0.98	0.0 - 1750 K/µL
MPV	N/A	≤ 5.0%	≥ 0.72	2.0-18.0 fL

Table 1-9 Operational Specifications

Operating Environment	
Temperature	15° - 30° C (59° - 86° F)
Relative Humidity	20% to 80%, RHNC
Complete Cycle Times	
Startup (From Power Off)	~7 minutes
Startup (From Standby)	~5 minutes
Count Cycle, Patient	~52 seconds
Count Cycle + FrgWBC	~100 seconds
Count Cycle + ResRBC	~100 seconds
Shutdown (To Standby)	~130 seconds
Shutdown (To Power Off)	~130 seconds
Throughput	
CS Model	
Open	80 Samples/Hour
Closed	68 Samples/Hour
SL Model	
Open	80 Samples/Hour
Closed	68 Samples/Hour
Whole Blood Aspiration Volume	
Open Mode	125 µL
Closed Mode	250 µL
Specimen Tube Dimensions	
Diameter	13 mm
Length	75 mm
Minimum Specimen Volumes	
Closed and Sample Loader Mode	≥ 1 mL
Open Mode	500 µL
Batch Size	
1 to 50 tubes per batch	
Bar Code Formats	
Interleaved 2-of-5 code	
Codabar	
Code 39	
Code 128 (check digit only)	

Bar Code Specifications

- Printed on good quality label stock
- 0.25-inch quiet zone on each end
- 0.01-inch minimum narrow bar width
- 0.5-inch minimum bar length
- 2-inch maximum label length
- 1.25-inch maximum label width

2 Troubleshooting

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2.1 Summary

This chapter contains the following information for CELL-DYN 3200:

- Error Messages
- Isolation Procedures (IPs)
- Block Diagrams
- Normal Scatter/Histograms
- Service Commands

2.2 Troubleshooting Approach

Troubleshooting is required whenever an Observed Error or a Displayed Error occurs. Displayed Errors can be viewed on the Bulletin Line or status box of the Data Station screen. (The Bulletin Line is down about 3/4 way on the screen.) Detailed information can be found in the fault report screen of the diagnostics submenu.

When a malfunction occurs, follow these recommended procedures:

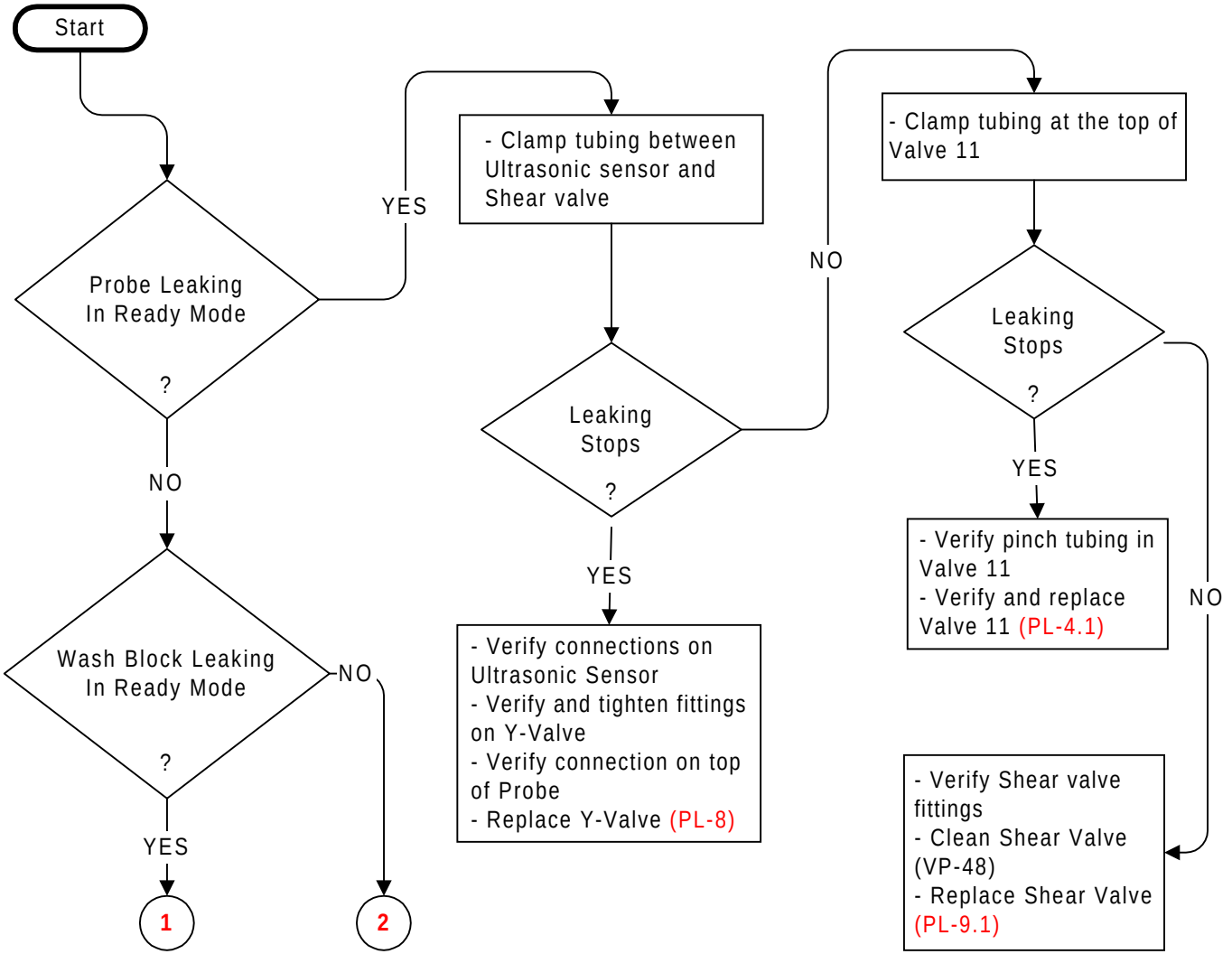
1. Use this Troubleshooting Guide as follows:
   a. If possible, begin by verifying the reported error. Perform the exact procedure that produced the error condition.
   b. When an error occurs, either observed or displayed, look up the error in:
      - **the Error Messages table or**
      - **IP 27, Sample Loader & Aspiration Tower Error Messages table**
   c. To refer to the appropriate IP or VP, click on the red link.
   d. Begin at the START box and follow the directions in the IP.
   e. If a part is adjusted or replaced, go to Section 5.2, Verification Matrix.
   f. Find the part in left column.
   g. Perform VPs in order given (i.e., 1, 2, 3, 4 etc.)
2. Perform Total Call.

2.3 Error Messages

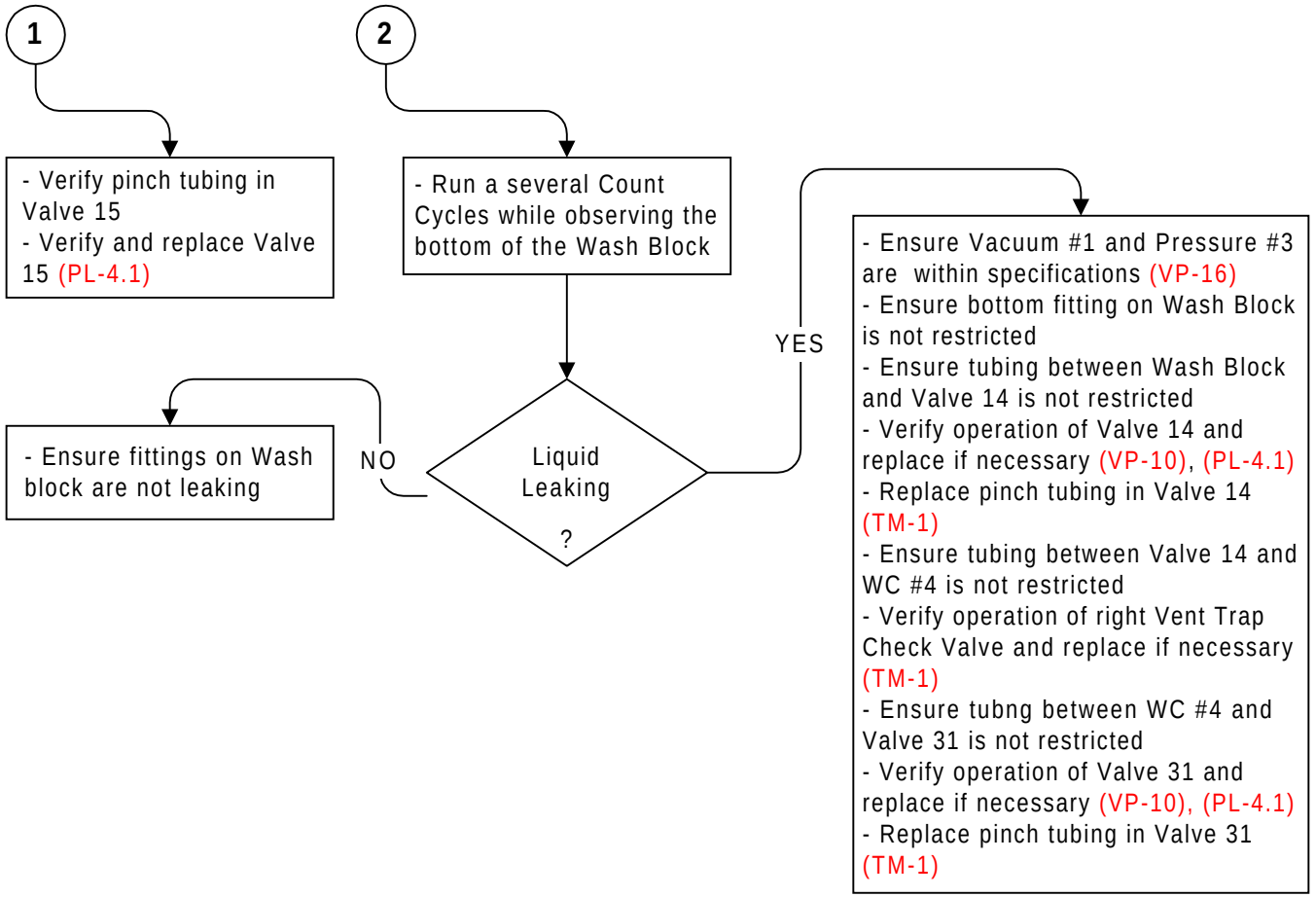
Error	Corrective Action
Background, HGB Too High	IP-13
Background, RBC/ PLT Too High	IP-8
Background, WBC Too High	IP-8
Bar Code Reader Failure	IP-27
C:\ Hard Drive Errors	IP-25
Controls Out	IP-10
Diluent/Sheath Empty	IP-7
Erratic Results, HGB	IP-13
Erratic Results, Optical	IP-6 Ensure Blood Sample is Fresh. Differential count is not reliable before 30 minutes or after 12 hours after sample is drawn.
External Waste Full	IP-22
Flags	IP-21
Flow Errors	IP-4
Fluid Leaks, Closed Mode Probe	IP-2
Fluid Leaks, Open Mode Probe	IP-1
HCT Errors	IP-14
HGB Errors	IP-13
Histogram Errors	IP-9
HSSL Com Failures	IP-24
Incomplete Aspiration	IP-3
Invalid Tube Height	IP-27
Leaks, Pressure	IP-18
Leaks, Vacuum	IP-19
Load Zone Empty Detector Malfunction	IP-27
MCH Errors	IP-14
MCHC Errors	IP-14
MCV Errors	IP-14
Message Reception Timeout	IP-24
Mix Head Not At Top Position	IP-27
Mix Head Stuck At Top Position	IP-27
Mix Head Stuck In Angle Position	IP-27
Mix Head Stuck In Vertical Position	IP-27
Mix Zone Rack Position Error	IP-27
No Tube Present	IP-27
Overpressure, Diluent Syringe	IP-5
Precision Problems	HGB IP-16, OPT IP-15
Pressure Errors	IP-17
Printer Errors	IP-26
Probe Stuck At Home Position	IP-27
Probe Unable To Reach Home Position	IP-27
Rack Bar Code Read Failure	IP-27
Shear Valve Position Fault	IP-20

Error	Corrective Action
Tube Dropped During Mixing	IP-27
Tube Lost Moving From Position 3 To 4	IP-27
Tube Position Bar Code Read Failure	IP-27
Tube Stuck In Position 3	IP-27
Tube Stuck In Position 4	IP-27
Unexpected Tube In Position 4 After Rack Advance	IP-27
Unload Area Hardware Malfunction	IP-27
Unload Zone Full Detector Malfunction	IP-27
Unload Zone Nearly Full Detector Malfunction	IP-27
Vacuum Accumulator 1 Wet	IP-11
Vacuum Accumulator 2 Wet	IP-12
Vacuum Errors	IP-17
WBC Imprecision	IP-15 Ensure Blood Sample is Fresh. Differential count is not reliable before 30 minutes or after 12 hours after sample is drawn.
WBC/HGB Lyse Empty	IP-7
X-B Errors	IP-14

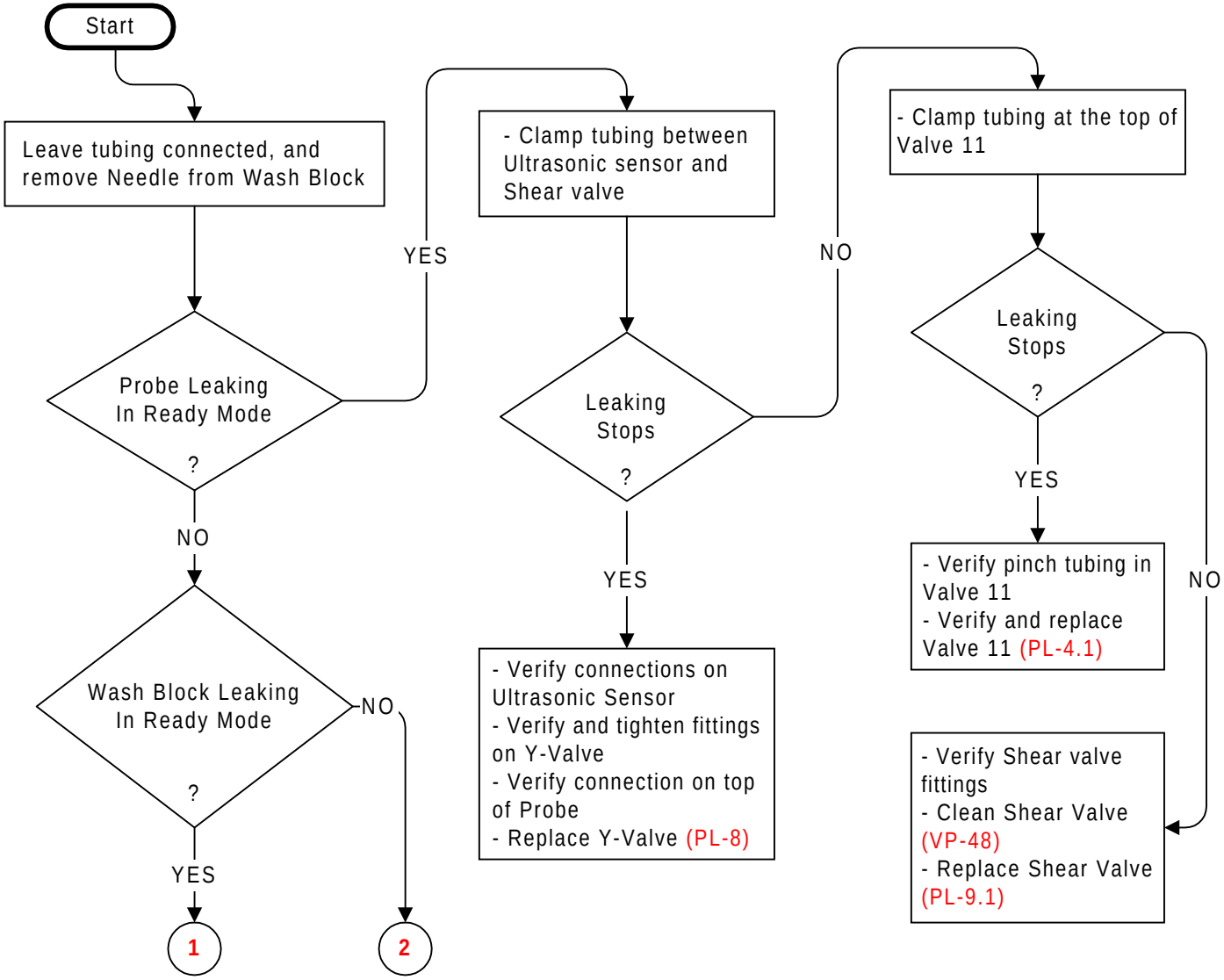
IP-1 Fluid Leaks, Open Mode Probe or Wash Block (Page 1 of 2)



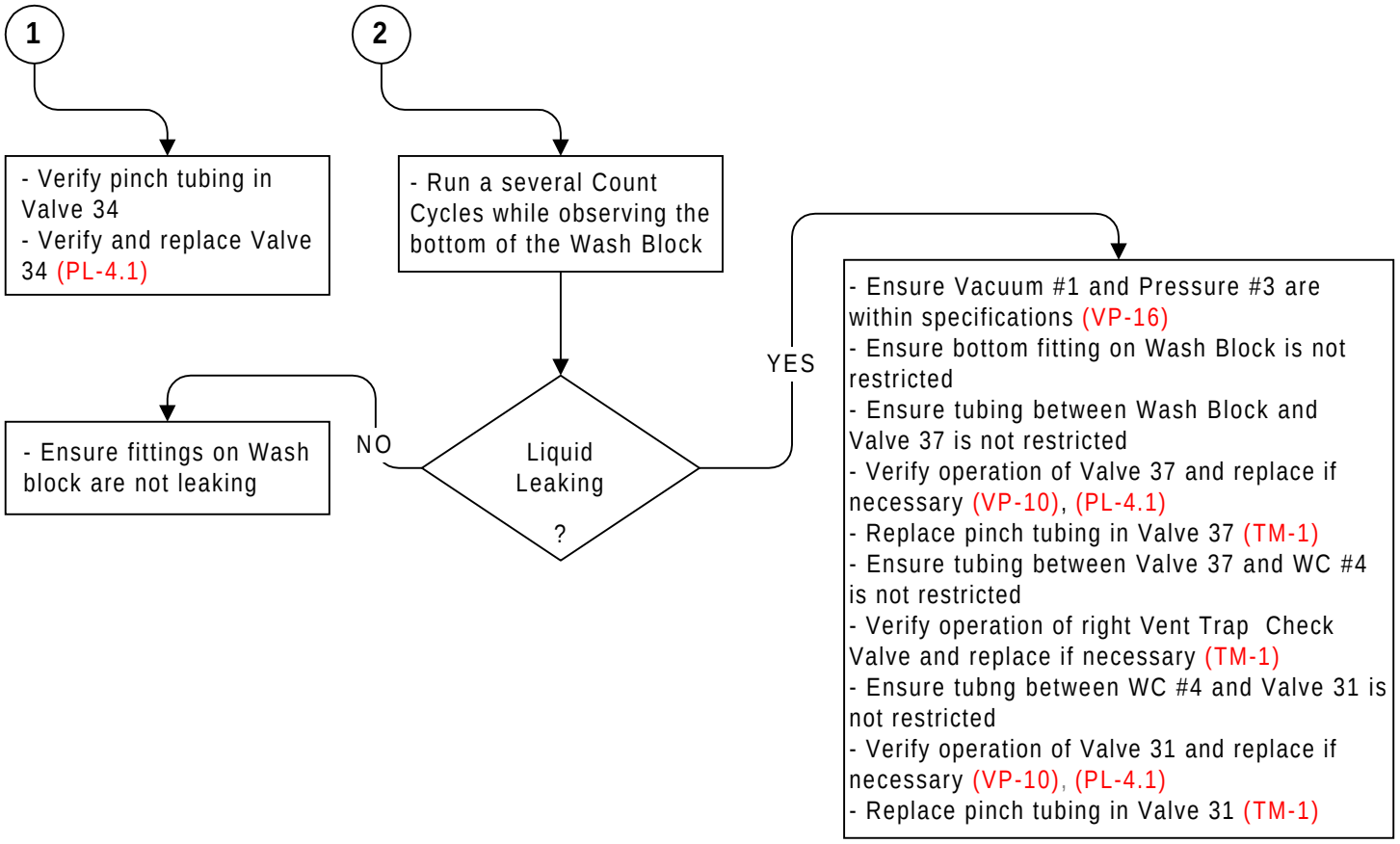
IP-1 Fluid Leaks, Open Mode Probe or Wash Block (Page 2 of 2)


1
2
- Verify pinch tubing in Valve 15
- Verify and replace Valve 15 (PL-4.1)
- Run a several Count Cycles while observing the bottom of the Wash Block
Liquid Leaking ?
NO
YES
- Ensure fittings on Wash block are not leaking
- Ensure Vacuum #1 and Pressure #3 are within specifications (VP-16)
- Ensure bottom fitting on Wash Block is not restricted
- Ensure tubing between Wash Block and Valve 14 is not restricted
- Verify operation of Valve 14 and replace if necessary (VP-10), (PL-4.1)
- Replace pinch tubing in Valve 14 (TM-1)
- Ensure tubing between Valve 14 and WC #4 is not restricted
- Verify operation of right Vent Trap Check Valve and replace if necessary (TM-1)
- Ensure tubng between WC #4 and Valve 31 is not restricted
- Verify operation of Valve 31 and replace if necessary (VP-10), (PL-4.1)
- Replace pinch tubing in Valve 31 (TM-1)

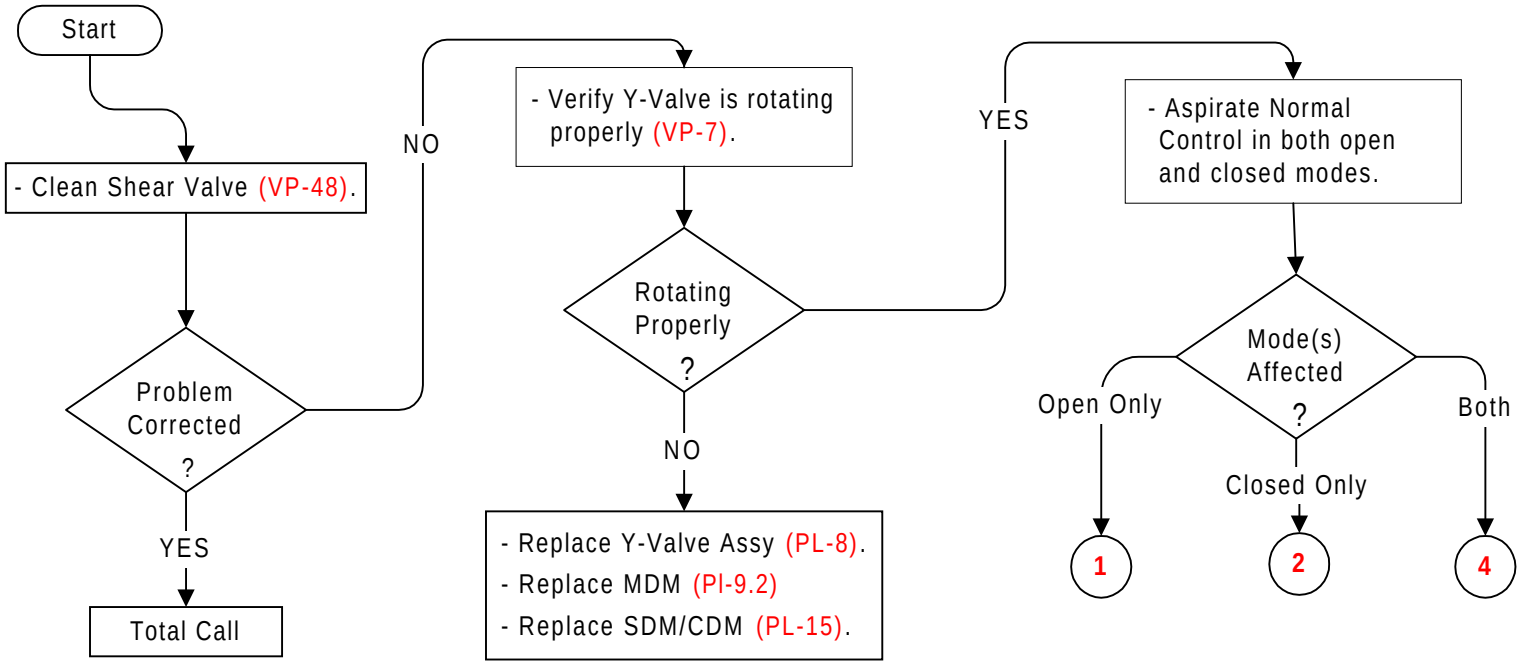
IP-2 Fluid Leaks, Closed Mode Needle or Wash Block (Page 1 of 2)


Start
Leave tubing connected, and remove Needle from Wash Block
Probe Leaking In Ready Mode ?
YES
- Clamp tubing between Ultrasonic sensor and Shear valve
Leaking Stops ?
NO
- Clamp tubing at the top of Valve 11
Leaking Stops ?
YES
- Verify pinch tubing in Valve 11
- Verify and replace Valve 11 (PL-4.1)
NO
- Verify Shear valve fittings
- Clean Shear Valve (VP-48)
- Replace Shear Valve (PL-9.1)
YES
- Verify connections on Ultrasonic Sensor
- Verify and tighten fittings on Y-Valve
- Verify connection on top of Probe
- Replace Y-Valve (PL-8)
NO
Wash Block Leaking In Ready Mode ?
YES
1
NO
2

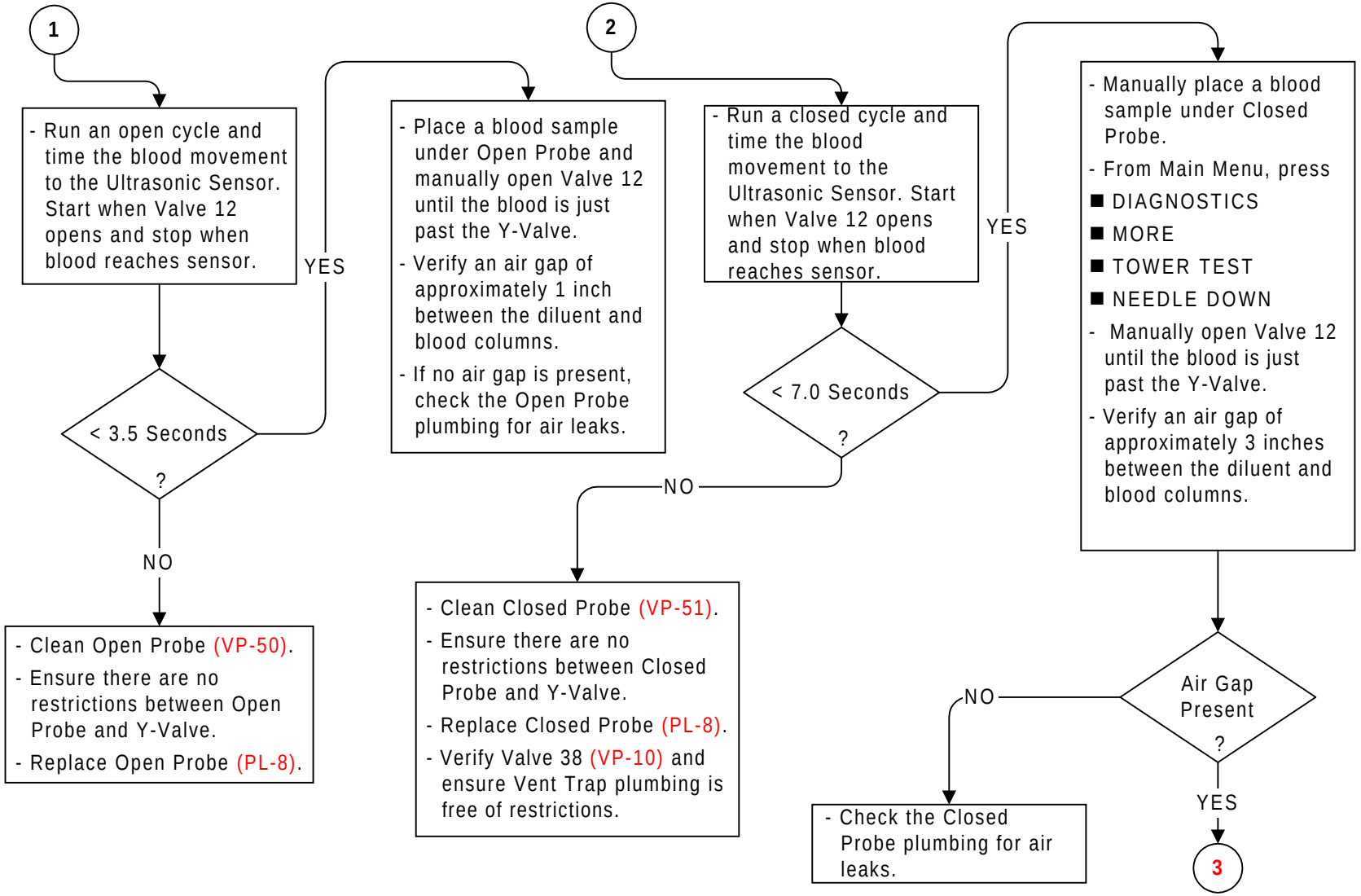
IP-2 Fluid Leaks, Closed Mode Needle or Wash Block (Page 2 of 2)


1
2
- Verify pinch tubing in Valve 34
- Verify and replace Valve 34 (PL-4.1)
- Run a several Count Cycles while observing the bottom of the Wash Block
Liquid Leaking ?
NO
YES
- Ensure fittings on Wash block are not leaking
- Ensure Vacuum #1 and Pressure #3 are within specifications (VP-16)
- Ensure bottom fitting on Wash Block is not restricted
- Ensure tubing between Wash Block and Valve 37 is not restricted
- Verify operation of Valve 37 and replace if necessary (VP-10), (PL-4.1)
- Replace pinch tubing in Valve 37 (TM-1)
- Ensure tubing between Valve 37 and WC #4 is not restricted
- Verify operation of right Vent Trap Check Valve and replace if necessary (TM-1)
- Ensure tubng between WC #4 and Valve 31 is not restricted
- Verify operation of Valve 31 and replace if necessary (VP-10), (PL-4.1)
- Replace pinch tubing in Valve 31 (TM-1)

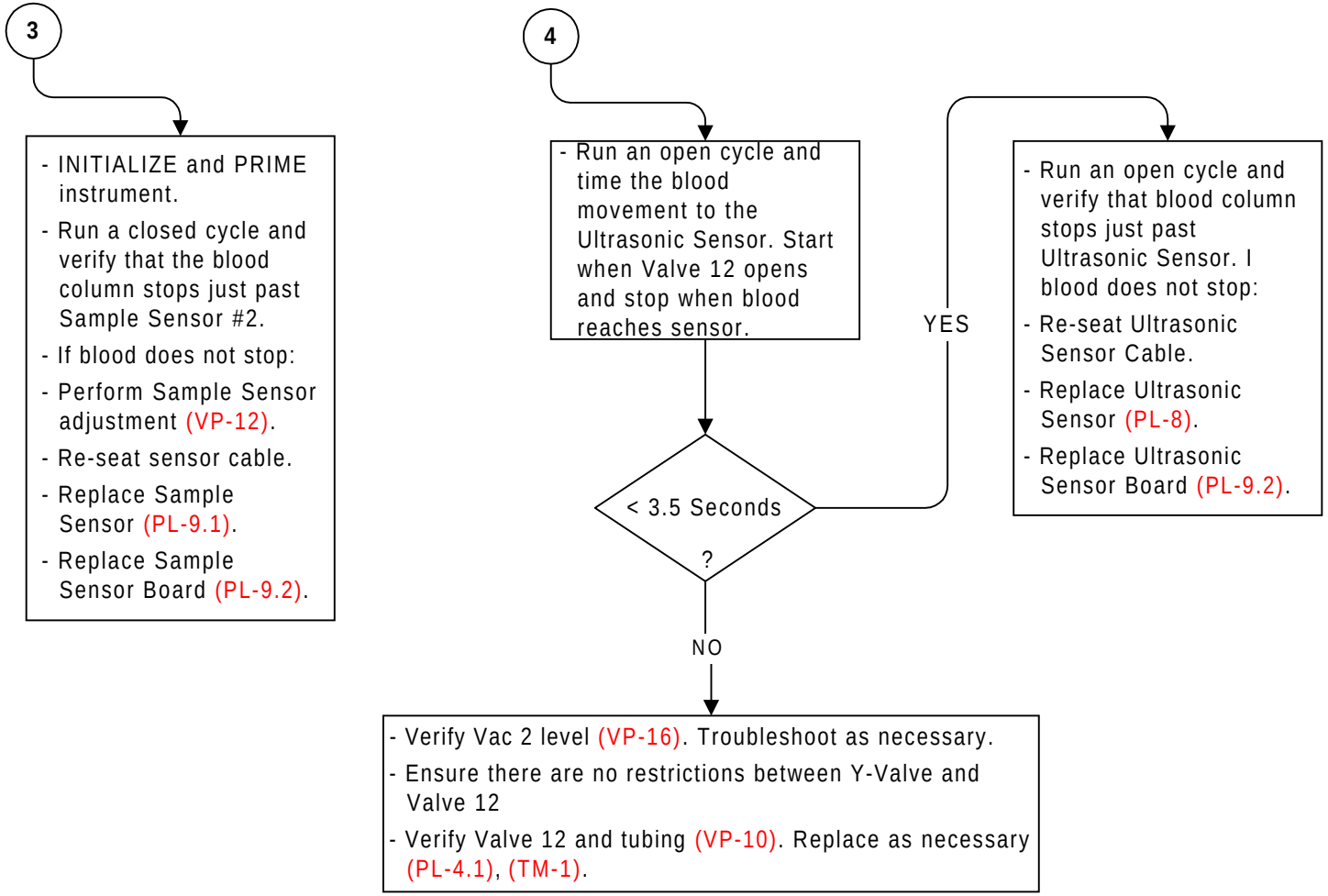
IP-3 Incomplete Aspiration (Page 1 of 3)



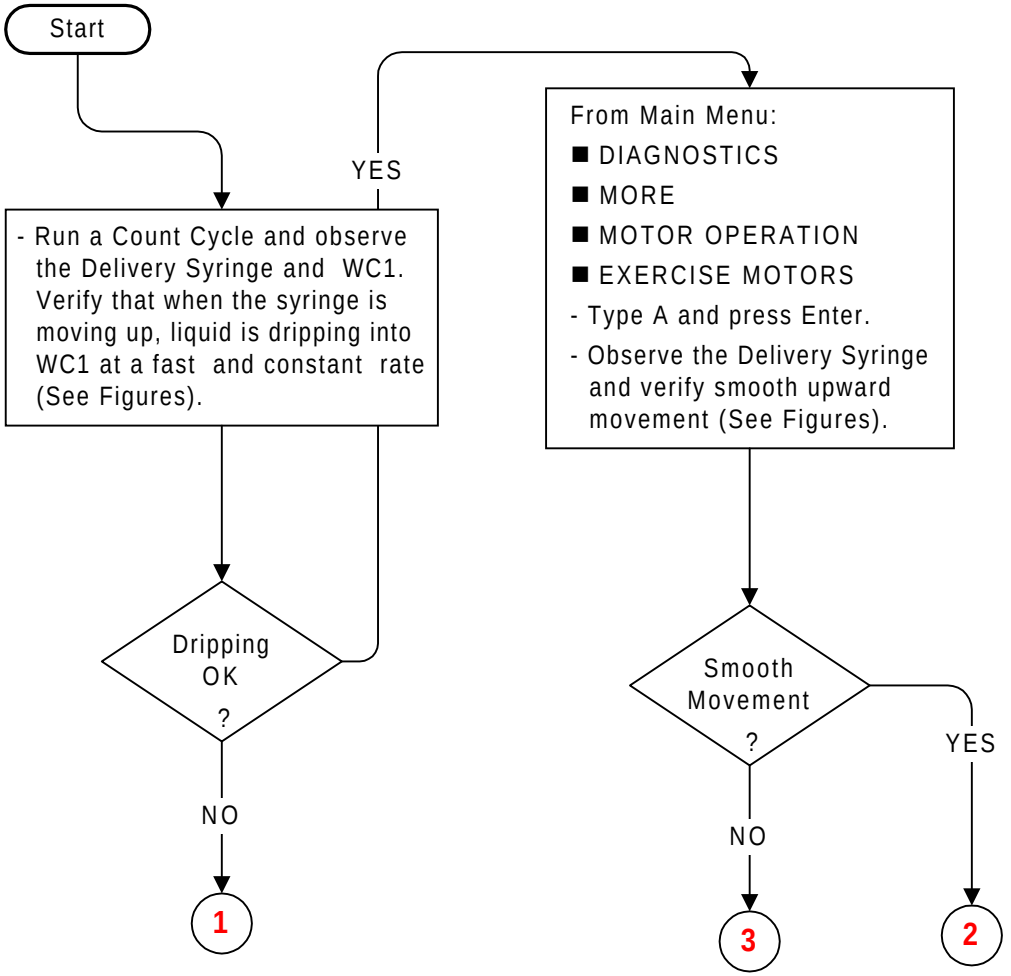
IP-3 Incomplete Aspiration (Page 2 of 3)

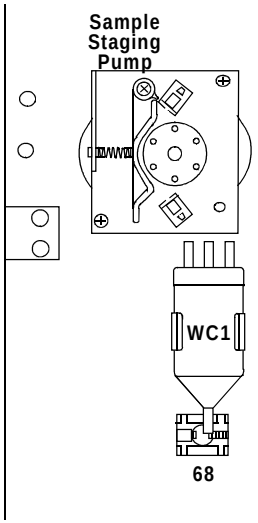

1
- Run an open cycle and time the blood movement to the Ultrasonic Sensor. Start when Valve 12 opens and stop when blood reaches sensor.
< 3.5 Seconds ?
YES
NO
- Clean Open Probe (VP-50).
- Ensure there are no restrictions between Open Probe and Y-Valve.
- Replace Open Probe (PL-8).
2
- Place a blood sample under Open Probe and manually open Valve 12 until the blood is just past the Y-Valve.
- Verify an air gap of approximately 1 inch between the diluent and blood columns.
- If no air gap is present, check the Open Probe plumbing for air leaks.
- Run a closed cycle and time the blood movement to the Ultrasonic Sensor. Start when Valve 12 opens and stop when blood reaches sensor.
< 7.0 Seconds ?
YES
NO
- Clean Closed Probe (VP-51).
- Ensure there are no restrictions between Closed Probe and Y-Valve.
- Replace Closed Probe (PL-8).
- Verify Valve 38 (VP-10) and ensure Vent Trap plumbing is free of restrictions.
- Manually place a blood sample under Closed Probe.
- From Main Menu, press
■ DIAGNOSTICS
■ MORE
■ TOWER TEST
■ NEEDLE DOWN
- Manually open Valve 12 until the blood is just past the Y-Valve.
- Verify an air gap of approximately 3 inches between the diluent and blood columns.
Air Gap Present ?
NO
YES
- Check the Closed Probe plumbing for air leaks.
3

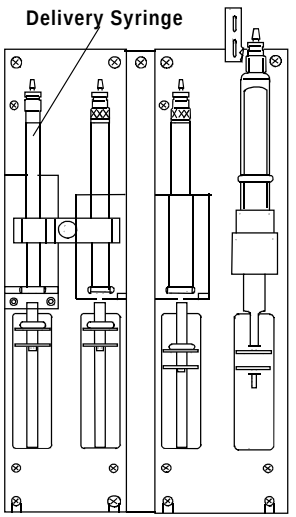
IP-3 Incomplete Aspiration (Page 3 of 3)


3
- INITIALIZE and PRIME instrument.
- Run a closed cycle and verify that the blood column stops just past Sample Sensor #2.
- If blood does not stop:
- Perform Sample Sensor adjustment (VP-12).
- Re-seat sensor cable.
- Replace Sample Sensor (PL-9.1).
- Replace Sample Sensor Board (PL-9.2).
4
- Run an open cycle and time the blood movement to the Ultrasonic Sensor. Start when Valve 12 opens and stop when blood reaches sensor.
< 3.5 Seconds ?
YES
- Run an open cycle and verify that blood column stops just past Ultrasonic Sensor. I blood does not stop:
- Re-seat Ultrasonic Sensor Cable.
- Replace Ultrasonic Sensor (PL-8).
- Replace Ultrasonic Sensor Board (PL-9.2).
NO
- Verify Vac 2 level (VP-16). Troubleshoot as necessary.
- Ensure there are no restrictions between Y-Valve and Valve 12
- Verify Valve 12 and tubing (VP-10). Replace as necessary (PL-4.1), (TM-1).

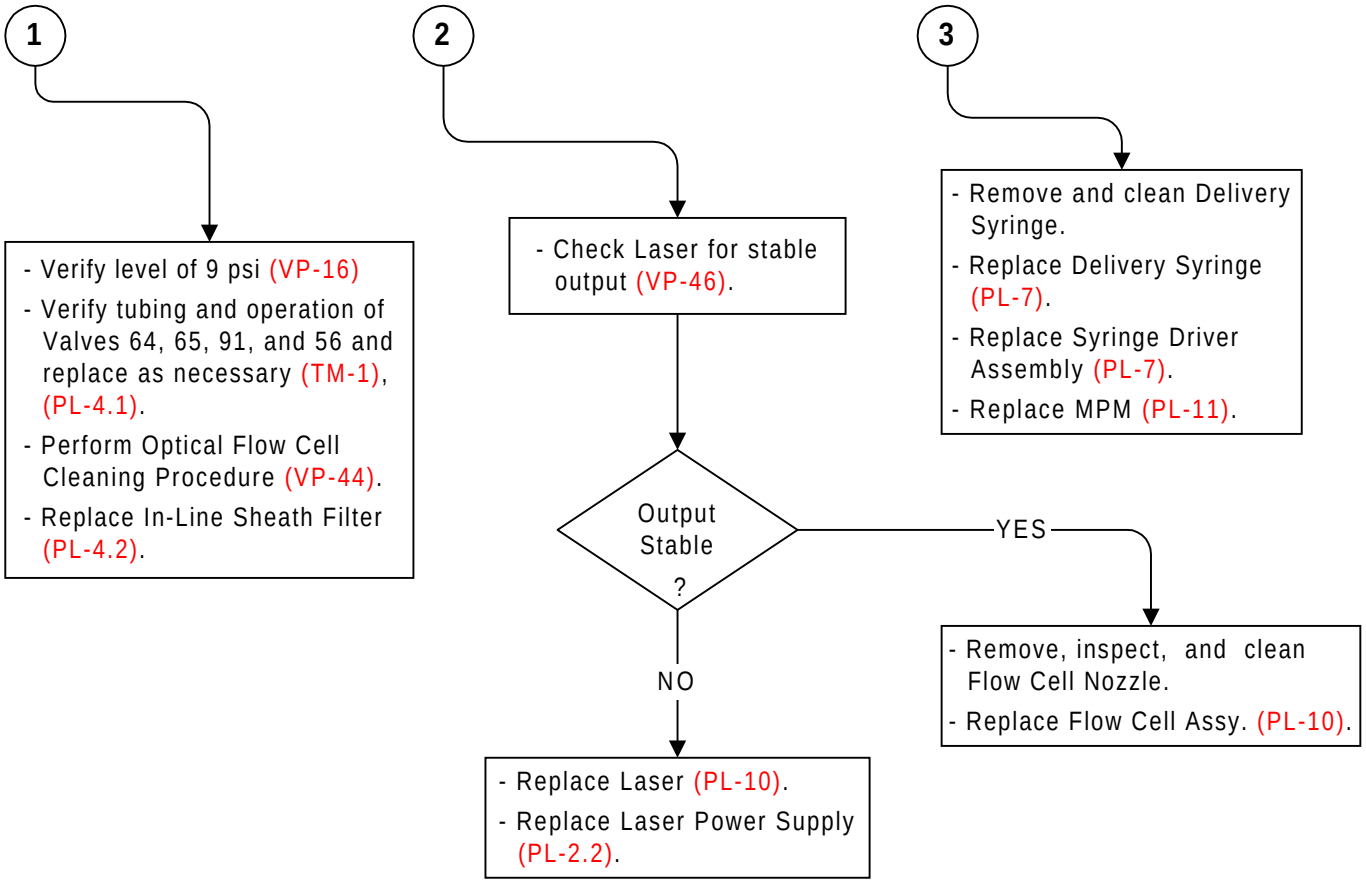
IP-4 Flow Errors (Page 1 of 2)


Start
- Run a Count Cycle and observe the Delivery Syringe and WC1. Verify that when the syringe is moving up, liquid is dripping into WC1 at a fast and constant rate (See Figures).
Dripping OK ?
YES
NO
1
From Main Menu:
■ DIAGNOSTICS
■ MORE
■ MOTOR OPERATION
■ EXERCISE MOTORS
- Type A and press Enter.
- Observe the Delivery Syringe and verify smooth upward movement (See Figures).
Smooth Movement ?
YES
NO
3
2

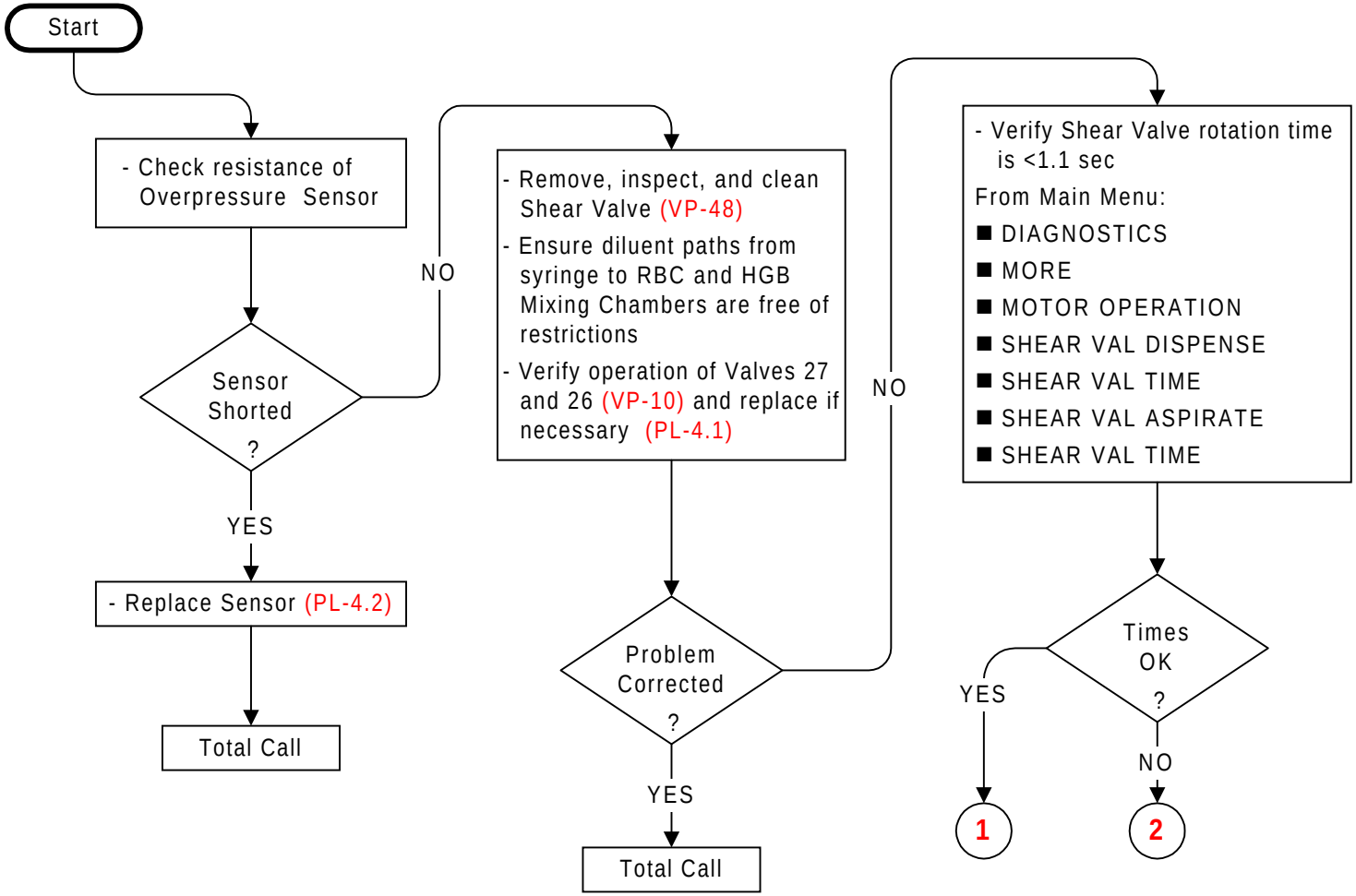




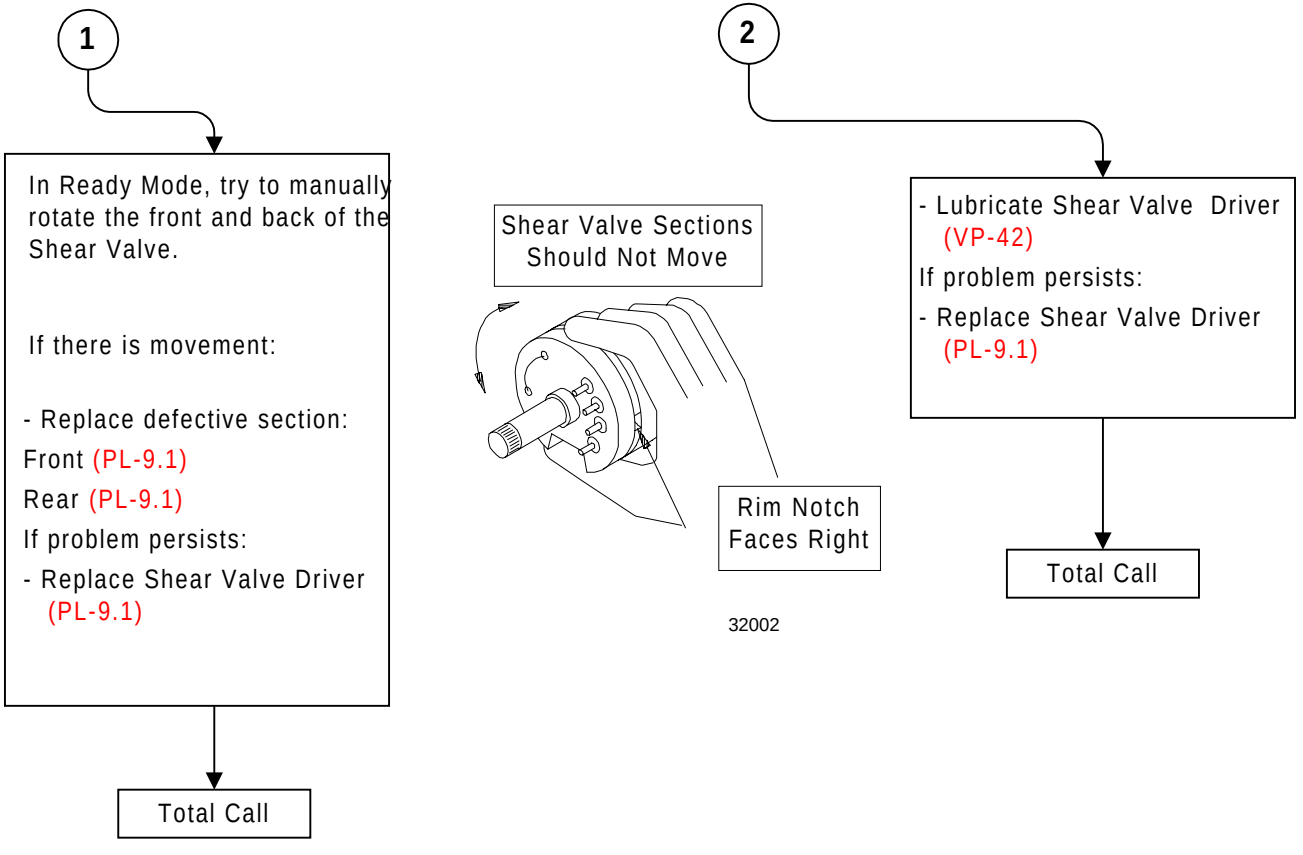
IP-4 Flow Errors (Page 2 of 2)


1
- Verify level of 9 psi (VP-16)
- Verify tubing and operation of Valves 64, 65, 91, and 56 and replace as necessary (TM-1), (PL-4.1).
- Perform Optical Flow Cell Cleaning Procedure (VP-44).
- Replace In-Line Sheath Filter (PL-4.2).
2
- Check Laser for stable output (VP-46).
Output Stable ?
YES
NO
- Remove, inspect, and clean Flow Cell Nozzle.
- Replace Flow Cell Assy. (PL-10).
- Replace Laser (PL-10).
- Replace Laser Power Supply (PL-2.2).
3
- Remove and clean Delivery Syringe.
- Replace Delivery Syringe (PL-7).
- Replace Syringe Driver Assembly (PL-7).
- Replace MPM (PL-11).

IP-5 RBC/HGB Diluent Overpressure (Page 1 of 2)

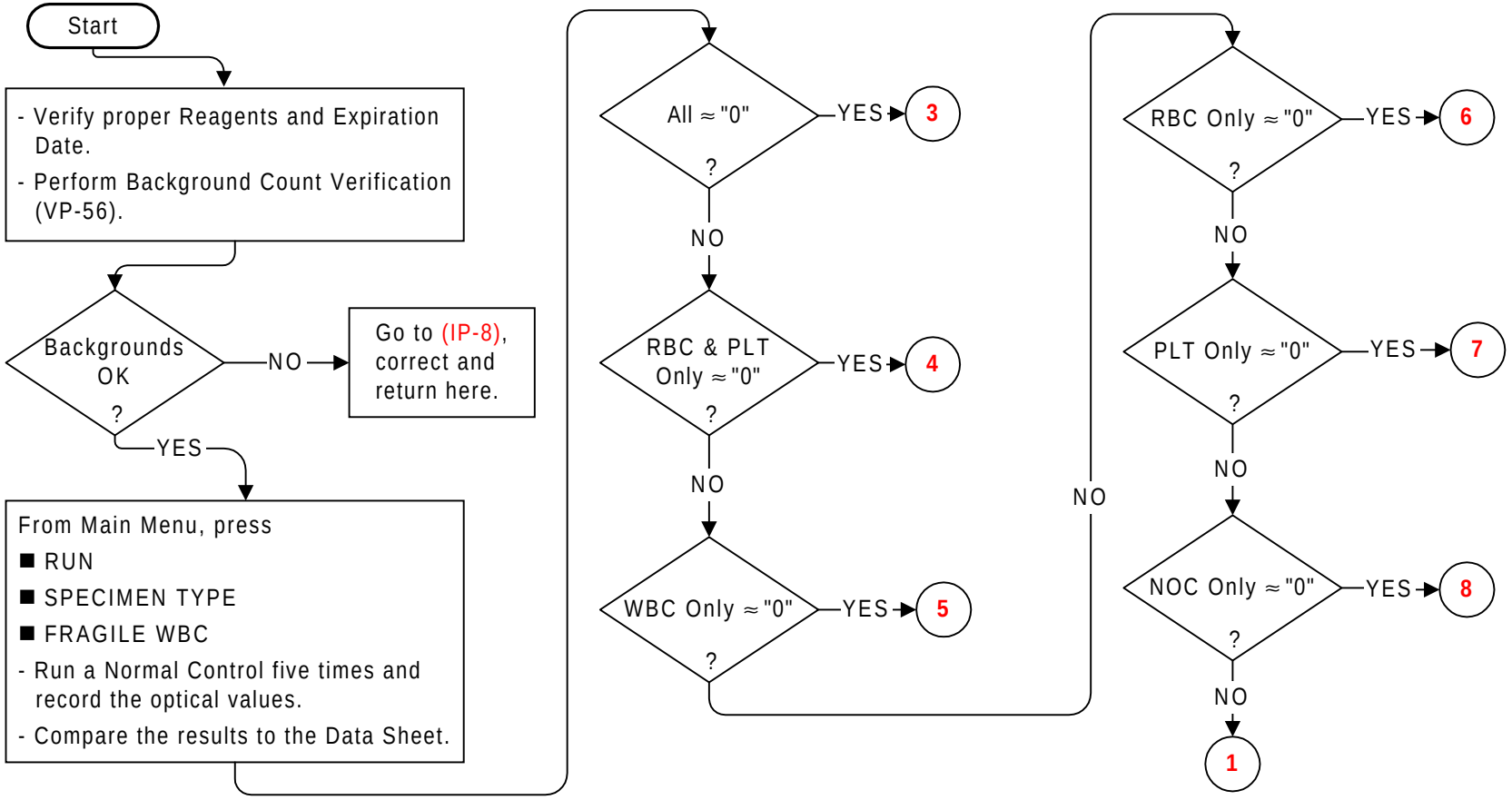


IP-5 RBC/HGB Diluent Overpressure (Page 2 of 2)

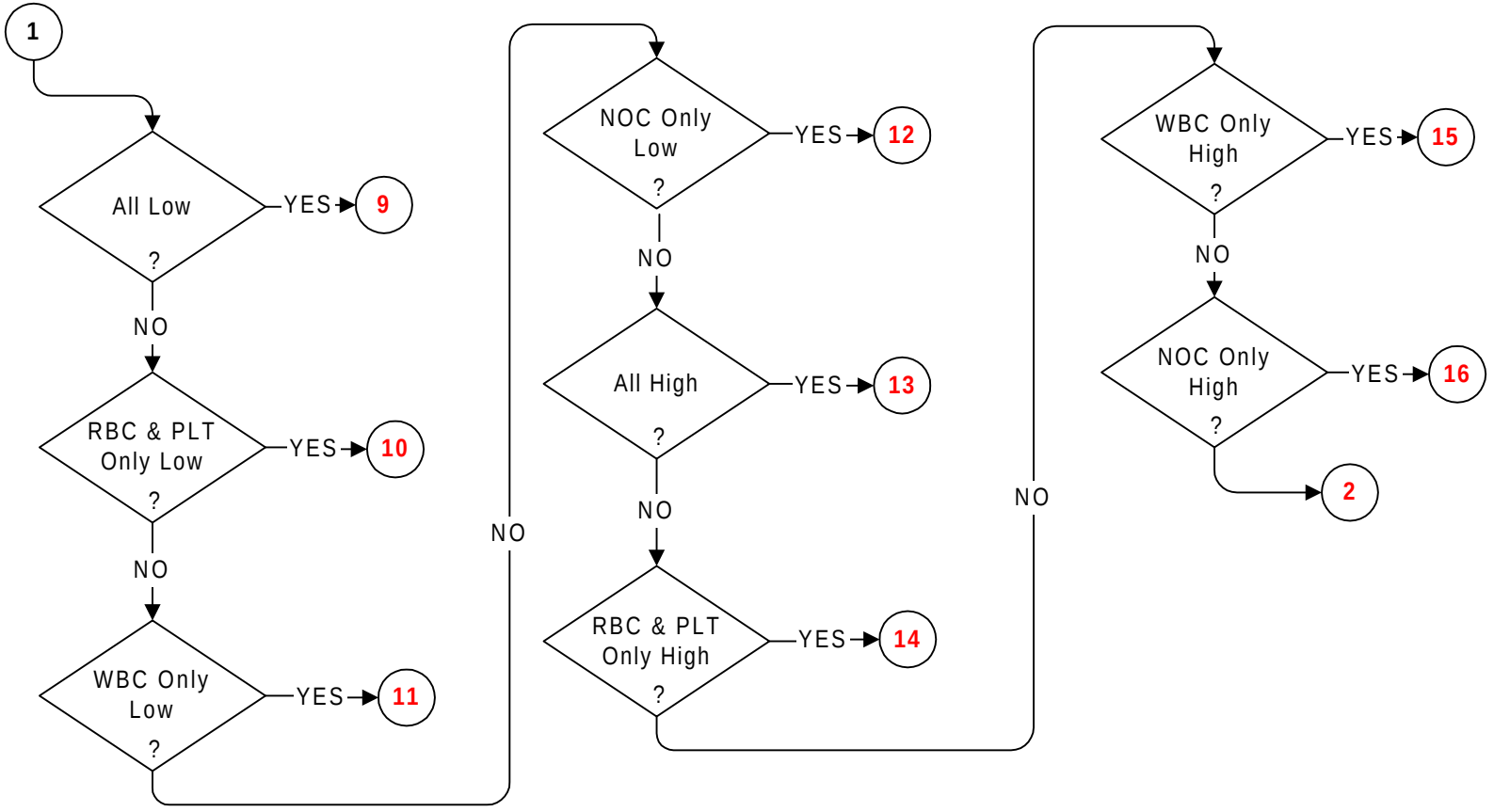

1
In Ready Mode, try to manually rotate the front and back of the Shear Valve.
If there is movement:
- Replace defective section:
Front (PL-9.1)
Rear (PL-9.1)
If problem persists:
- Replace Shear Valve Driver (PL-9.1)
Total Call
2
- Lubricate Shear Valve Driver (VP-42)
If problem persists:
- Replace Shear Valve Driver (PL-9.1)
Total Call
Shear Valve Sections Should Not Move
Rim Notch Faces Right
32002

IP-6 Optical Parameter Count Problems (Page 1 of 11)

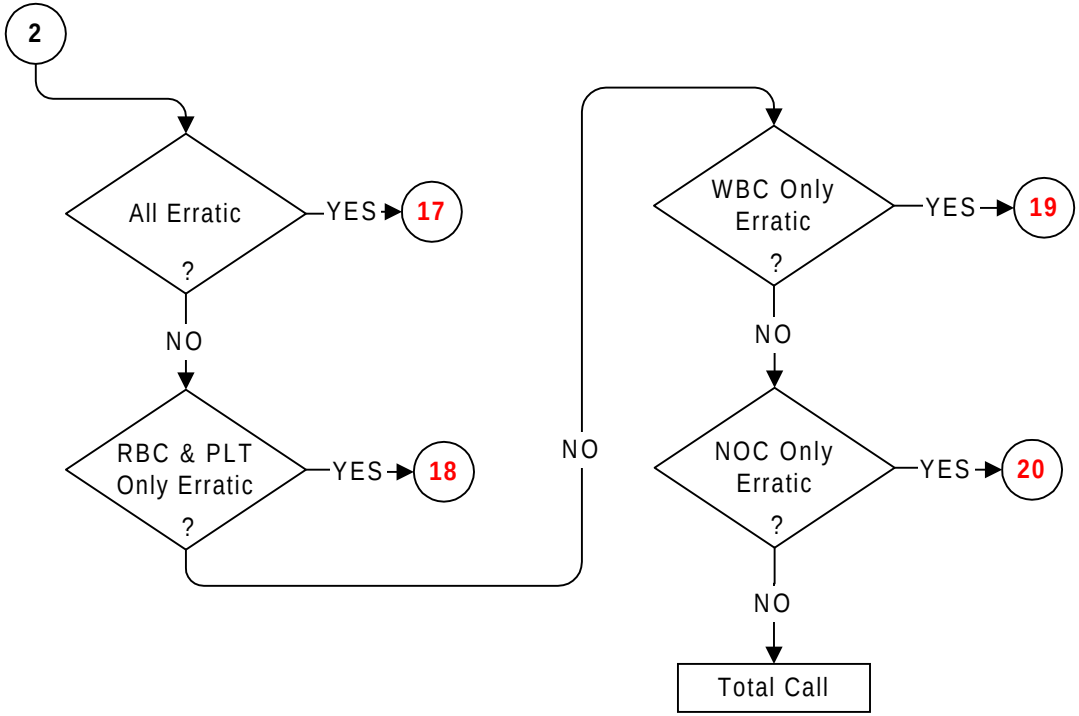
Note: This procedure assumes that HGB Results are OK in Open and Closed Modes, and there are no hardware or software Error Messages. It is designed to find and correct gross WBC, NOC, RBC, and PLT problems. For Optical Precision Problems see IP-15.



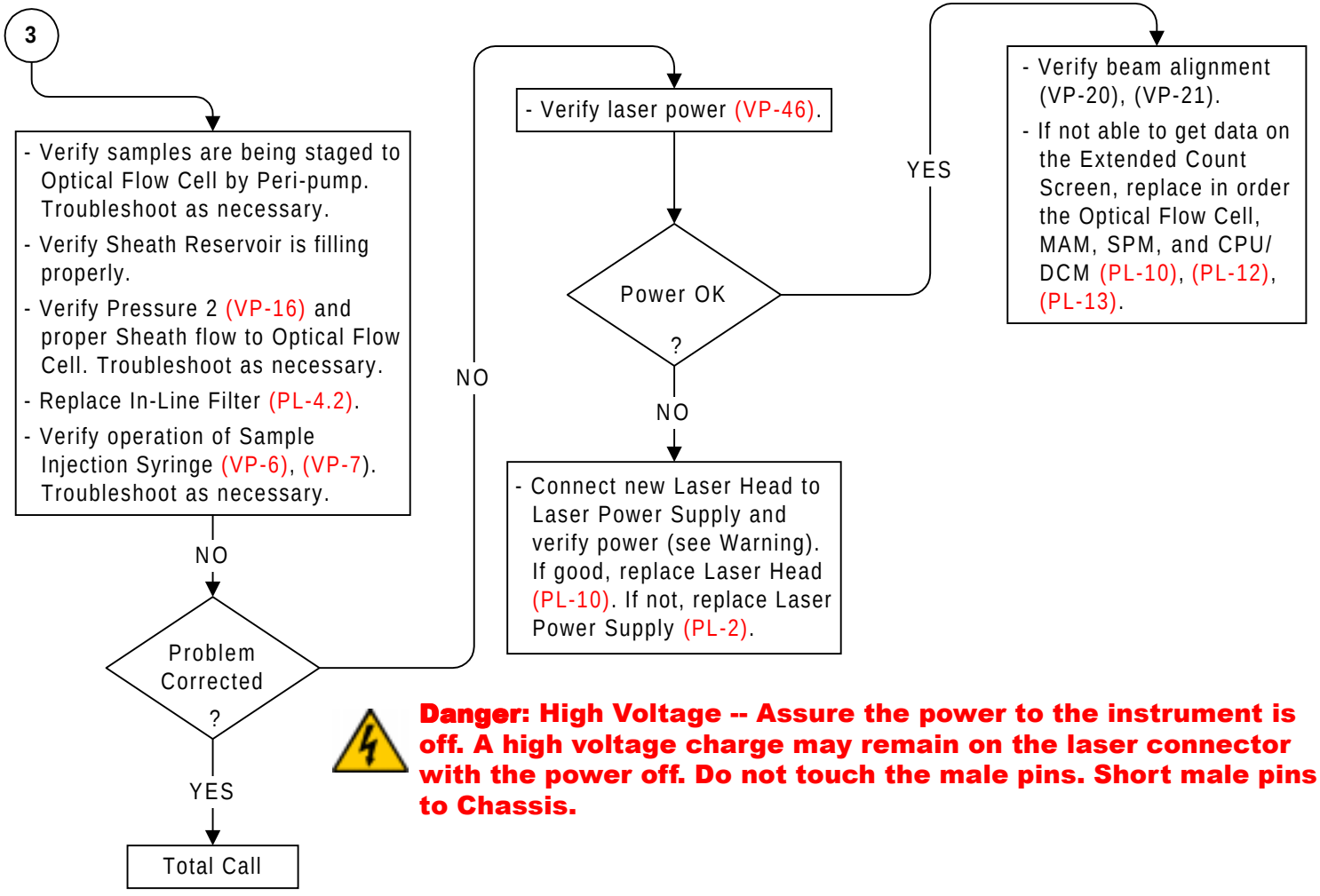
IP-6 Optical Parameter Count Problems (Page 2 of 11)



IP-6 Optical Parameter Count Problems (Page 3 of 11)

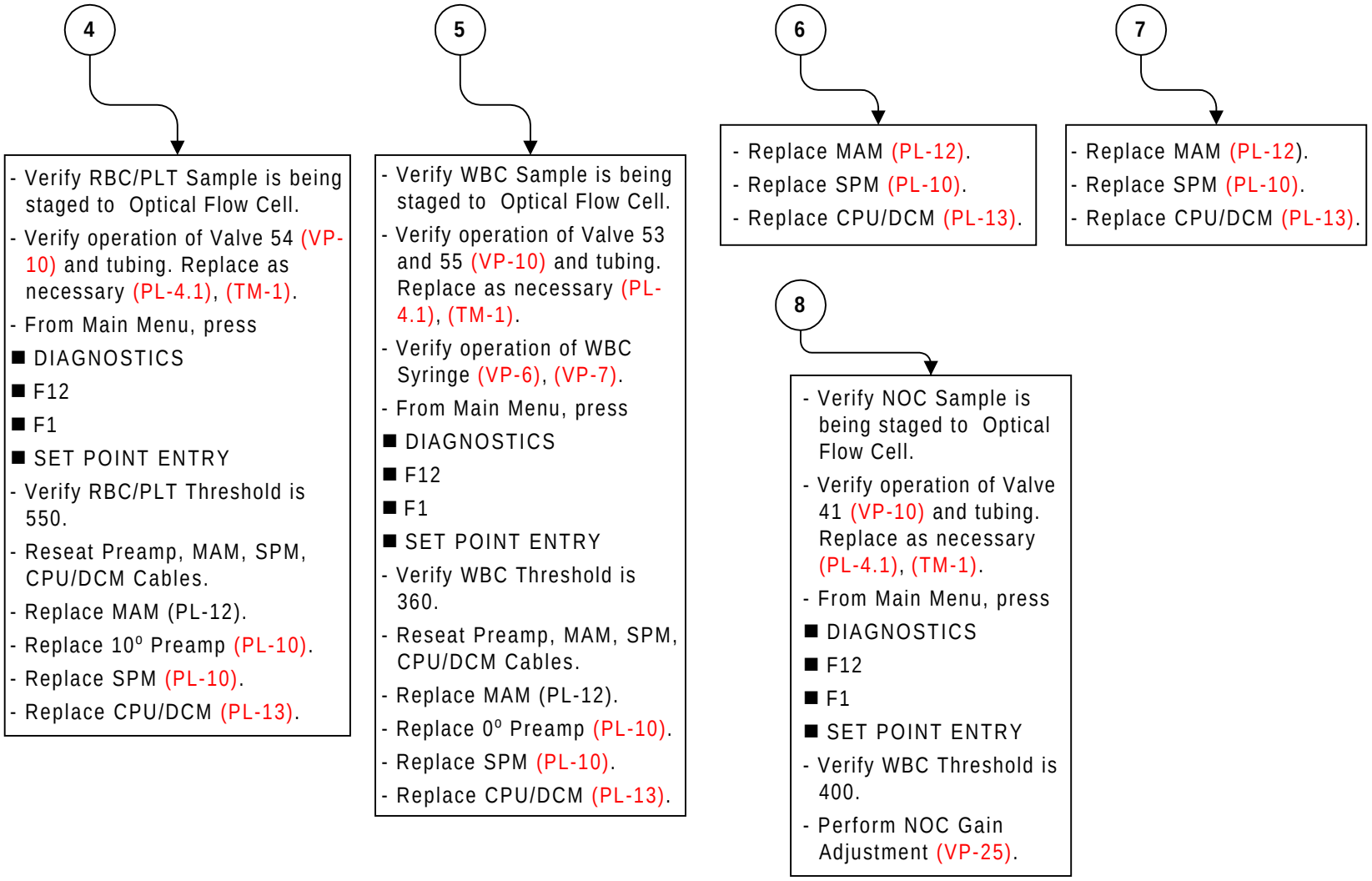


IP-6 Optical Parameter Count Problems (Page 4 of 11)

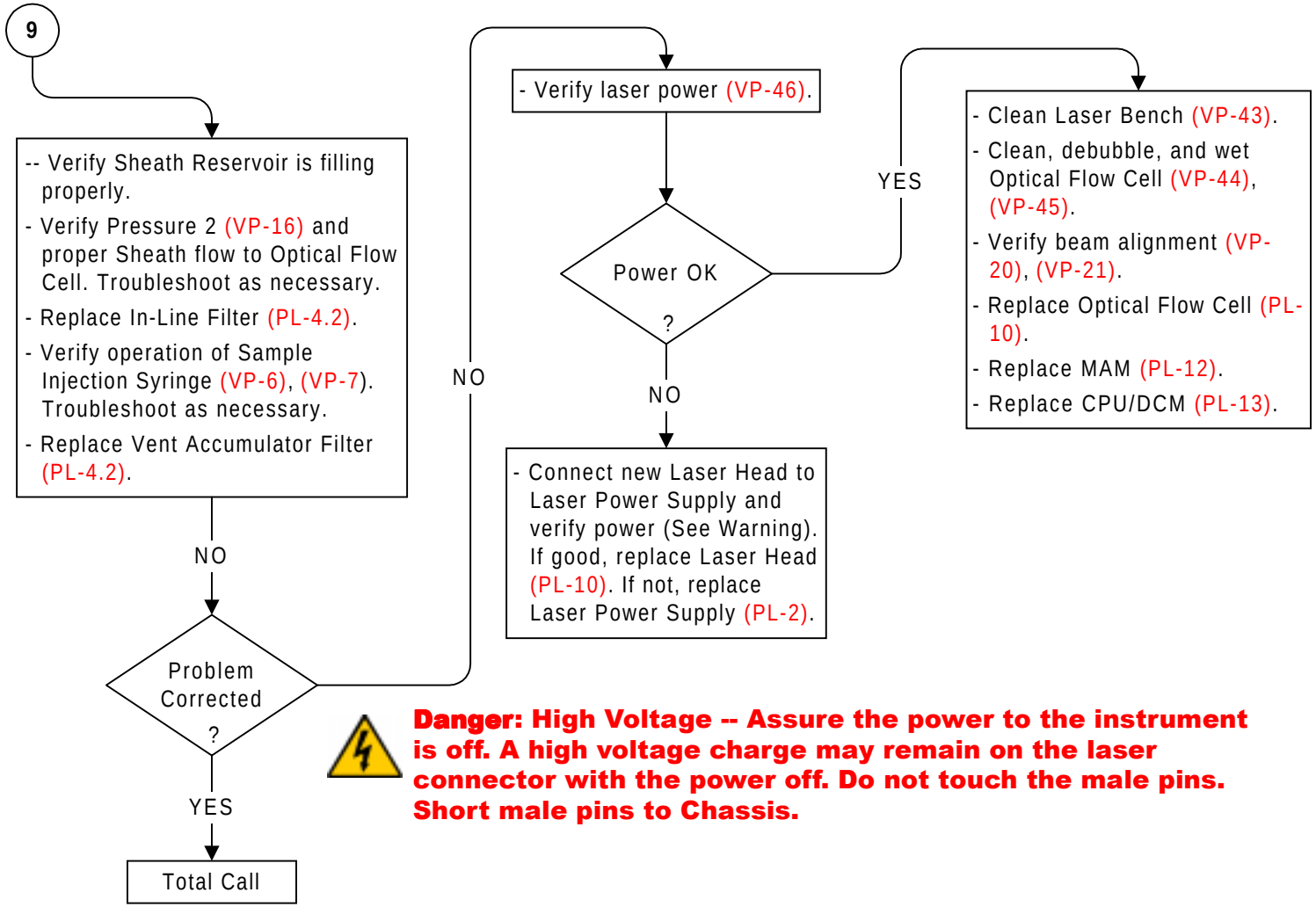

3
- Verify samples are being staged to Optical Flow Cell by Peri-pump. Troubleshoot as necessary.
- Verify Sheath Reservoir is filling properly.
- Verify Pressure 2 (VP-16) and proper Sheath flow to Optical Flow Cell. Troubleshoot as necessary.
- Replace In-Line Filter (PL-4.2).
- Verify operation of Sample Injection Syringe (VP-6), (VP-7). Troubleshoot as necessary.
NO
Problem Corrected ?
YES
Total Call
NO
- Verify laser power (VP-46).
Power OK ?
NO
- Connect new Laser Head to Laser Power Supply and verify power (see Warning). If good, replace Laser Head (PL-10). If not, replace Laser Power Supply (PL-2).
YES
- Verify beam alignment (VP-20), (VP-21).
- If not able to get data on the Extended Count Screen, replace in order the Optical Flow Cell, MAM, SPM, and CPU/ DCM (PL-10), (PL-12), (PL-13).

Danger: High Voltage -- Assure the power to the instrument is off. A high voltage charge may remain on the laser connector with the power off. Do not touch the male pins. Short male pins to Chassis.

IP-6 Optical Parameter Count Problems (Page 5 of 11)

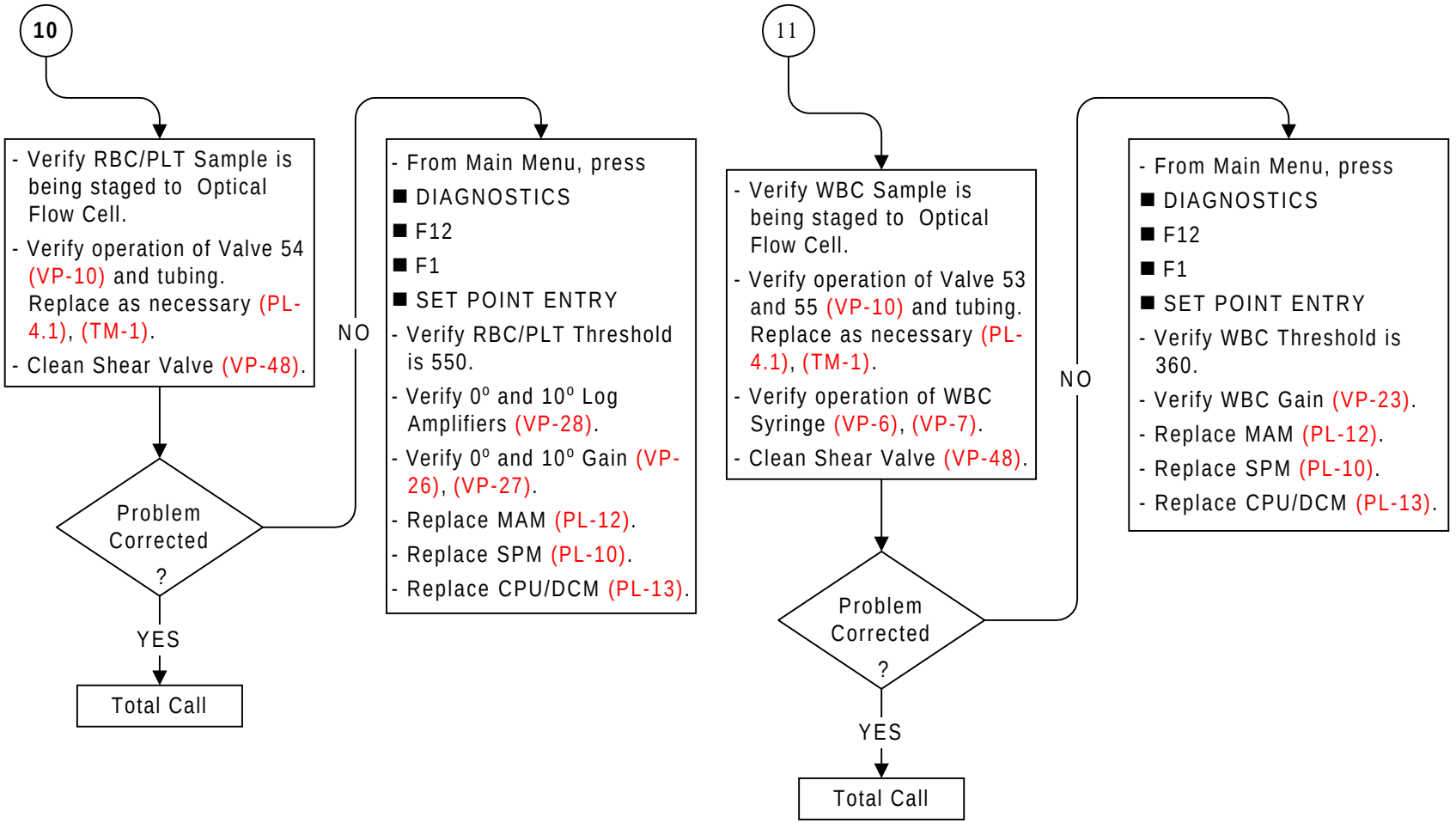

4
- Verify RBC/PLT Sample is being staged to Optical Flow Cell.
- Verify operation of Valve 54 (VP-10) and tubing. Replace as necessary (PL-4.1), (TM-1).
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify RBC/PLT Threshold is 550.
- Reseat Preamp, MAM, SPM, CPU/DCM Cables.
- Replace MAM (PL-12).
- Replace 10° Preamp (PL-10).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
5
- Verify WBC Sample is being staged to Optical Flow Cell.
- Verify operation of Valve 53 and 55 (VP-10) and tubing. Replace as necessary (PL-4.1), (TM-1).
- Verify operation of WBC Syringe (VP-6), (VP-7).
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify WBC Threshold is 360.
- Reseat Preamp, MAM, SPM, CPU/DCM Cables.
- Replace MAM (PL-12).
- Replace 0° Preamp (PL-10).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
6
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
7
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
8
- Verify NOC Sample is being staged to Optical Flow Cell.
- Verify operation of Valve 41 (VP-10) and tubing. Replace as necessary (PL-4.1), (TM-1).
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify WBC Threshold is 400.
- Perform NOC Gain Adjustment (VP-25).

IP-6 Optical Parameter Count Problems (Page 6 of 11)

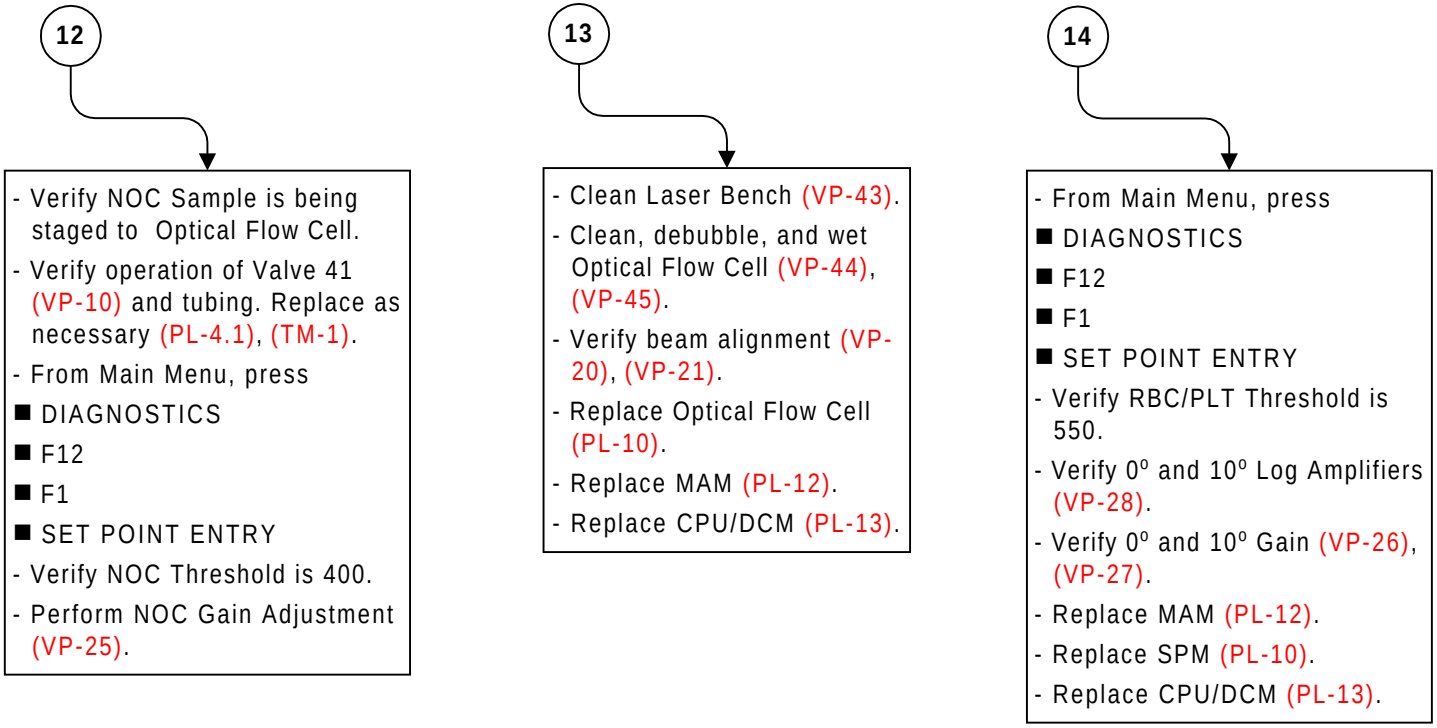

9
-- Verify Sheath Reservoir is filling properly.
- Verify Pressure 2 (VP-16) and proper Sheath flow to Optical Flow Cell. Troubleshoot as necessary.
- Replace In-Line Filter (PL-4.2).
- Verify operation of Sample Injection Syringe (VP-6), (VP-7). Troubleshoot as necessary.
- Replace Vent Accumulator Filter (PL-4.2).
NO
Problem Corrected ?
YES
Total Call
NO
- Verify laser power (VP-46).
Power OK ?
NO
- Connect new Laser Head to Laser Power Supply and verify power (See Warning). If good, replace Laser Head (PL-10). If not, replace Laser Power Supply (PL-2).
YES
- Clean Laser Bench (VP-43).
- Clean, debubble, and wet Optical Flow Cell (VP-44), (VP-45).
- Verify beam alignment (VP-20), (VP-21).
- Replace Optical Flow Cell (PL-10).
- Replace MAM (PL-12).
- Replace CPU/DCM (PL-13).

Danger: High Voltage -- Assure the power to the instrument is off. A high voltage charge may remain on the laser connector with the power off. Do not touch the male pins. Short male pins to Chassis.

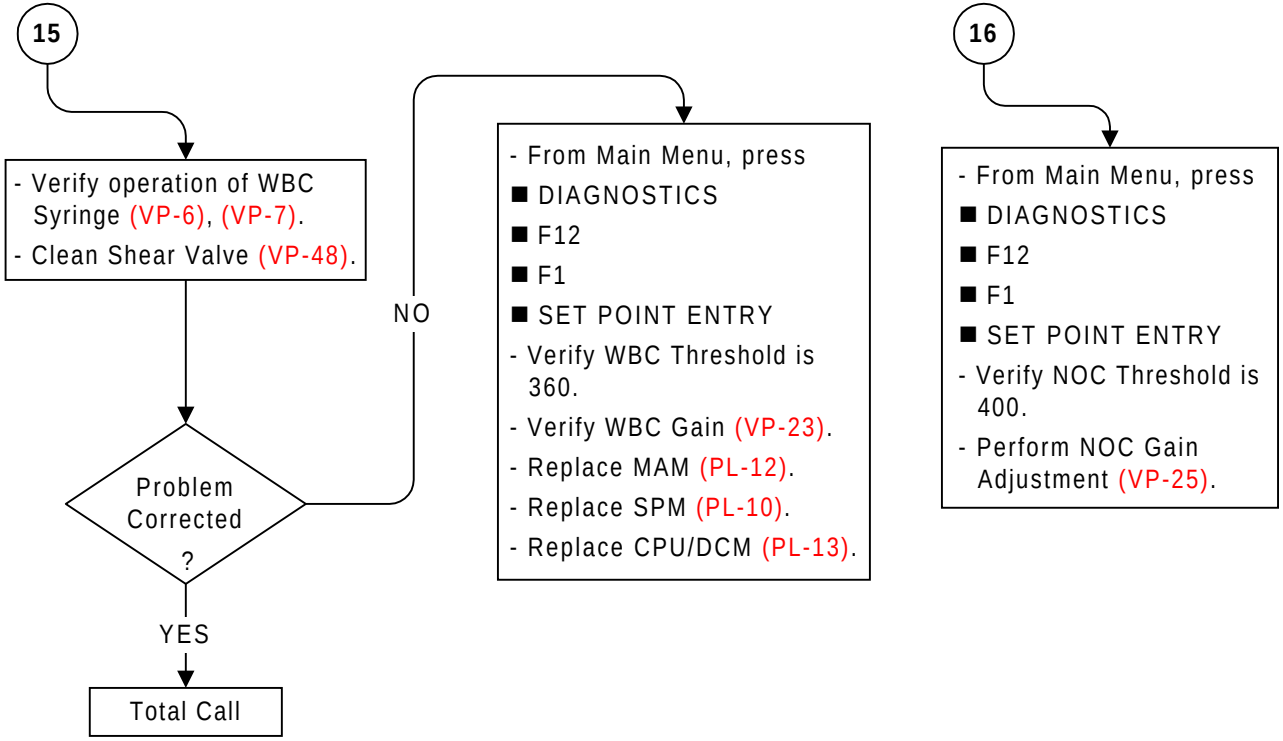
IP-6 Optical Parameter Count Problems (Page 7 of 11)


10
- Verify RBC/PLT Sample is being staged to Optical Flow Cell.
- Verify operation of Valve 54 (VP-10) and tubing. Replace as necessary (PL-4.1), (TM-1).
- Clean Shear Valve (VP-48).
Problem Corrected ?
NO
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify RBC/PLT Threshold is 550.
- Verify 0° and 10° Log Amplifiers (VP-28).
- Verify 0° and 10° Gain (VP-26), (VP-27).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
YES
Total Call
11
- Verify WBC Sample is being staged to Optical Flow Cell.
- Verify operation of Valve 53 and 55 (VP-10) and tubing. Replace as necessary (PL-4.1), (TM-1).
- Verify operation of WBC Syringe (VP-6), (VP-7).
- Clean Shear Valve (VP-48).
Problem Corrected ?
NO
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify WBC Threshold is 360.
- Verify WBC Gain (VP-23).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
YES
Total Call

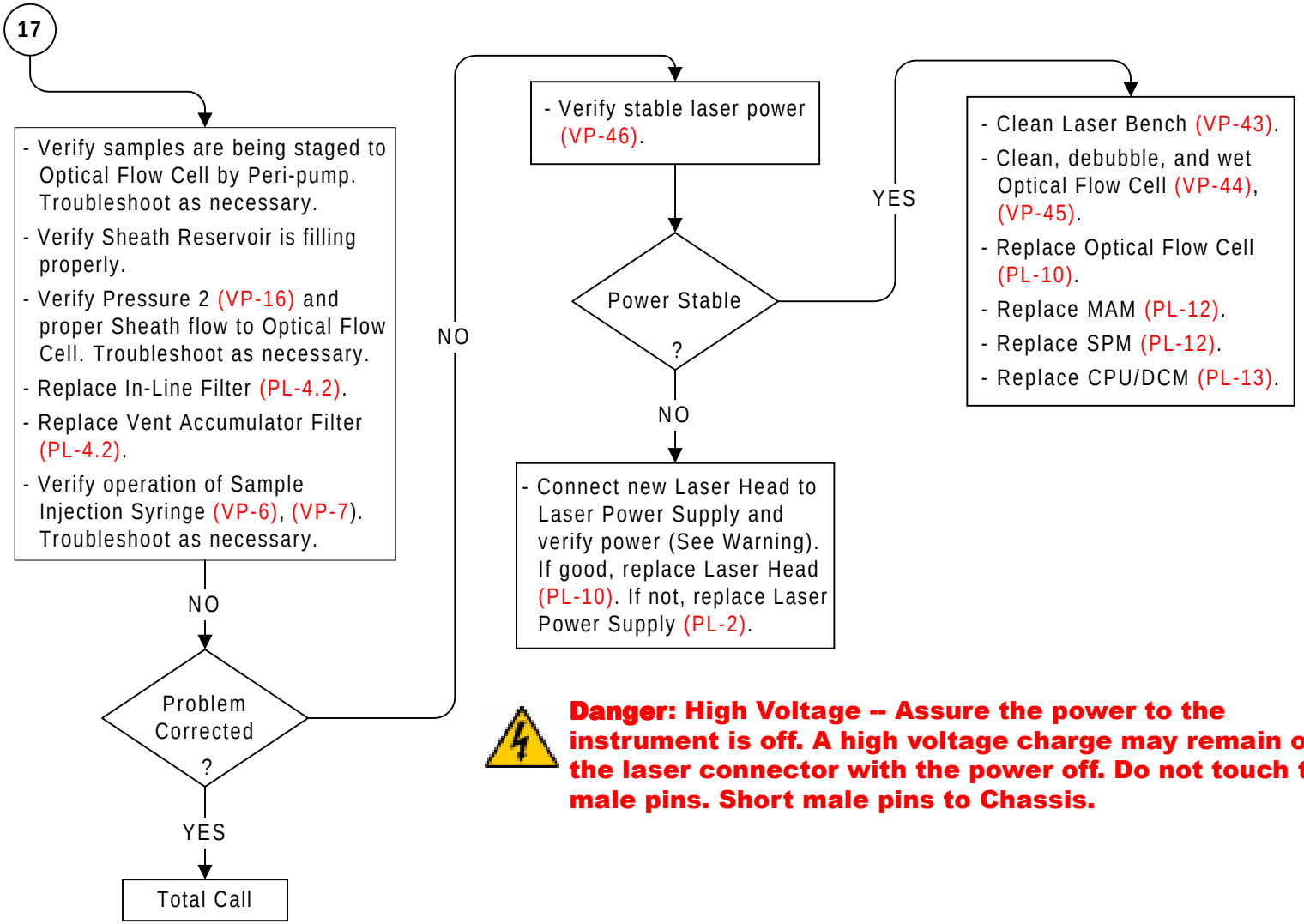
IP-6 Optical Parameter Count Problems (Page 8 of 11)


12
- Verify NOC Sample is being staged to Optical Flow Cell.
- Verify operation of Valve 41 (VP-10) and tubing. Replace as necessary (PL-4.1), (TM-1).
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify NOC Threshold is 400.
- Perform NOC Gain Adjustment (VP-25).
13
- Clean Laser Bench (VP-43).
- Clean, debubble, and wet Optical Flow Cell (VP-44), (VP-45).
- Verify beam alignment (VP-20), (VP-21).
- Replace Optical Flow Cell (PL-10).
- Replace MAM (PL-12).
- Replace CPU/DCM (PL-13).
14
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify RBC/PLT Threshold is 550.
- Verify 0° and 10° Log Amplifiers (VP-28).
- Verify 0° and 10° Gain (VP-26), (VP-27).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).

IP-6 Optical Parameter Count Problems (Page 9 of 11)

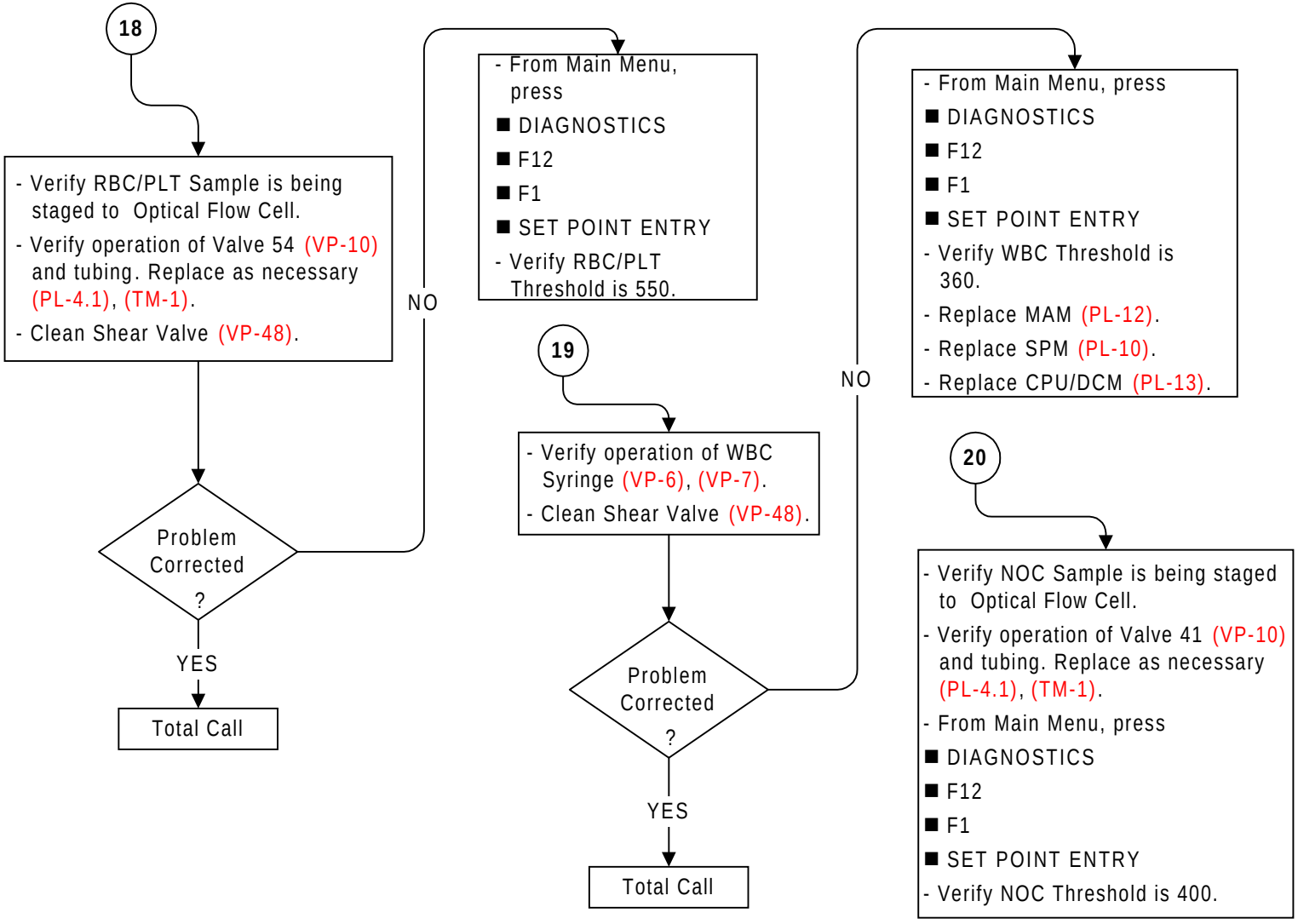


IP-6 Optical Parameter Count Problems (Page 10 of 11)

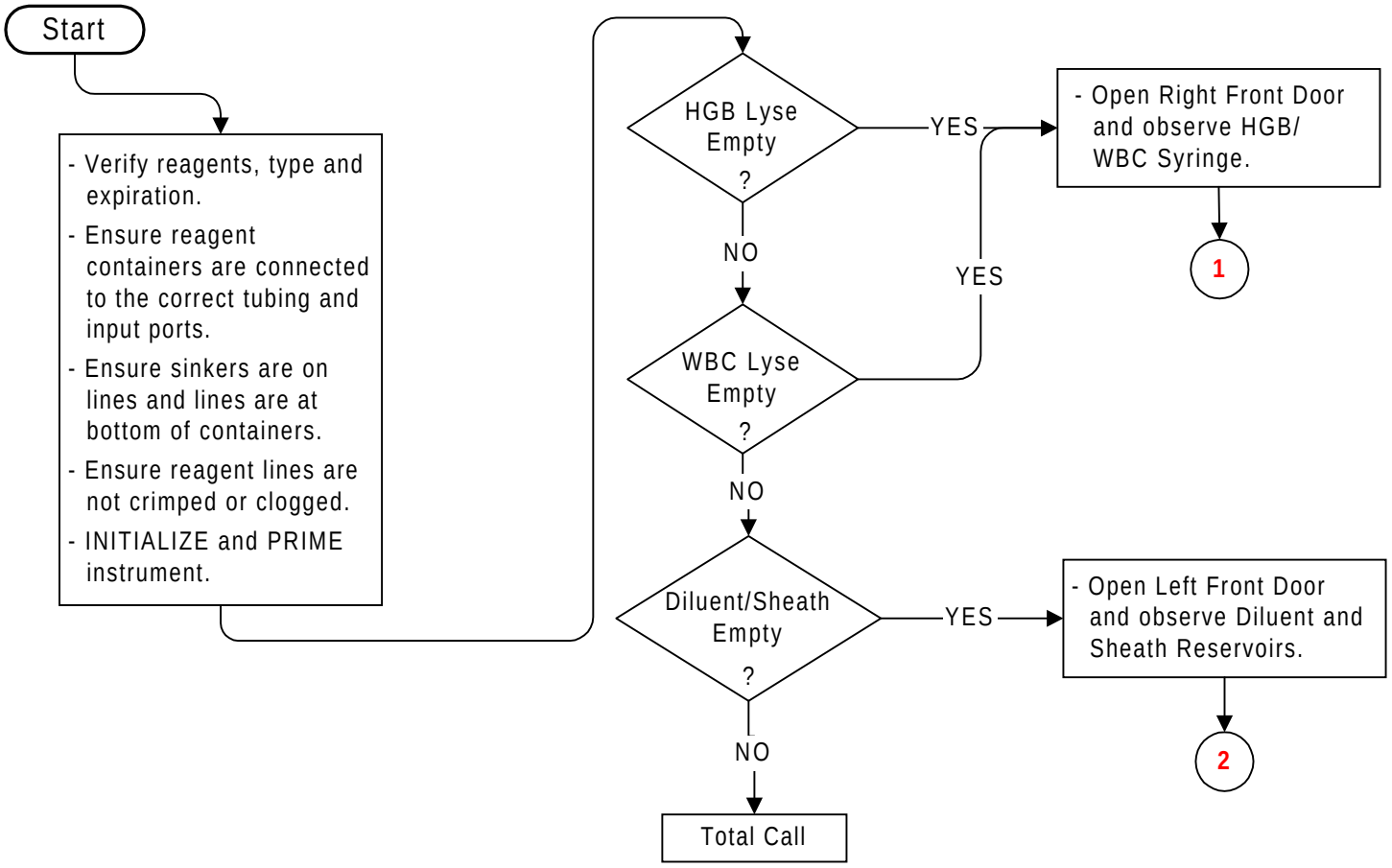

17
- Verify samples are being staged to Optical Flow Cell by Peri-pump. Troubleshoot as necessary.
- Verify Sheath Reservoir is filling properly.
- Verify Pressure 2 (VP-16) and proper Sheath flow to Optical Flow Cell. Troubleshoot as necessary.
- Replace In-Line Filter (PL-4.2).
- Replace Vent Accumulator Filter (PL-4.2).
- Verify operation of Sample Injection Syringe (VP-6), (VP-7). Troubleshoot as necessary.
NO
Problem Corrected ?
YES
Total Call
NO
- Verify stable laser power (VP-46).
Power Stable ?
NO
- Connect new Laser Head to Laser Power Supply and verify power (See Warning). If good, replace Laser Head (PL-10). If not, replace Laser Power Supply (PL-2).
YES
- Clean Laser Bench (VP-43).
- Clean, debubble, and wet Optical Flow Cell (VP-44), (VP-45).
- Replace Optical Flow Cell (PL-10).
- Replace MAM (PL-12).
- Replace SPM (PL-12).
- Replace CPU/DCM (PL-13).

Danger: High Voltage -- Assure the power to the instrument is off. A high voltage charge may remain on the laser connector with the power off. Do not touch the male pins. Short male pins to Chassis.

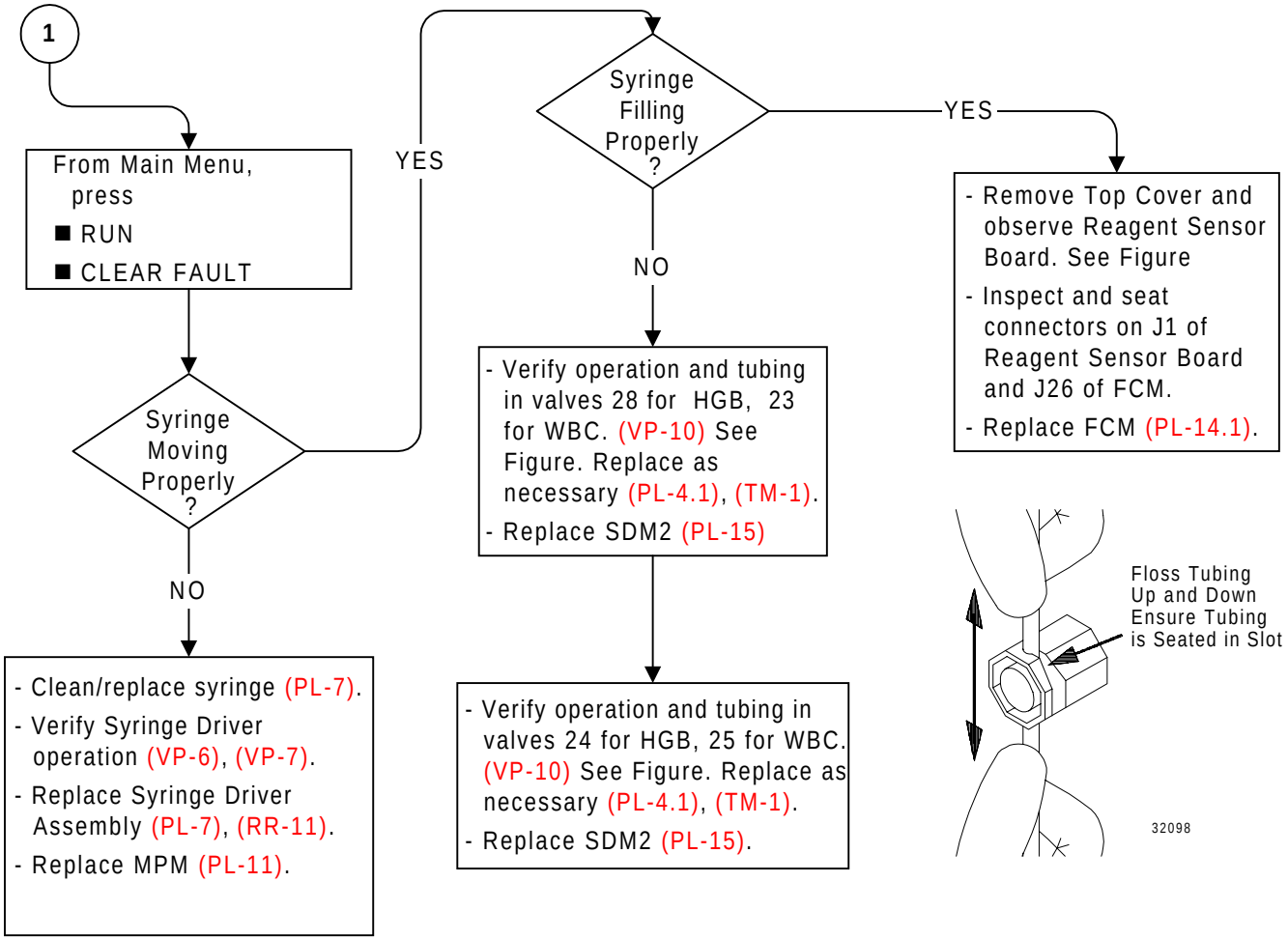
IP-6 Optical Parameter Count Problems (Page 11 of 11)


18
- Verify RBC/PLT Sample is being staged to Optical Flow Cell.
- Verify operation of Valve 54 (VP-10) and tubing. Replace as necessary (PL-4.1), (TM-1).
- Clean Shear Valve (VP-48).
Problem Corrected ?
NO
YES
Total Call
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify RBC/PLT Threshold is 550.
19
- Verify operation of WBC Syringe (VP-6), (VP-7).
- Clean Shear Valve (VP-48).
Problem Corrected ?
NO
YES
Total Call
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify WBC Threshold is 360.
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
20
- Verify NOC Sample is being staged to Optical Flow Cell.
- Verify operation of Valve 41 (VP-10) and tubing. Replace as necessary (PL-4.1), (TM-1).
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify NOC Threshold is 400.

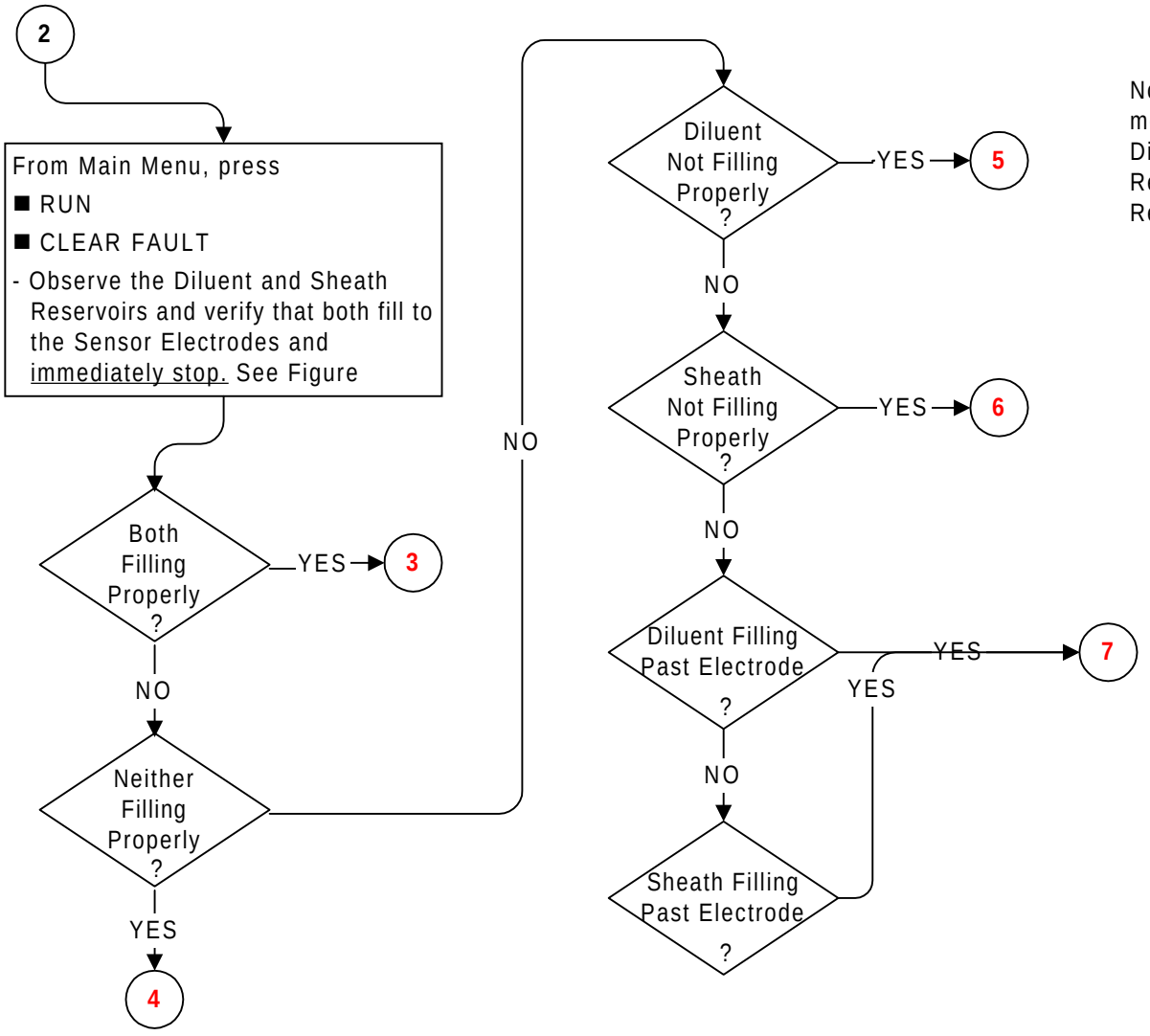
IP-7 Reagent Empty (Page 1 of 5)


Start
- Verify reagents, type and expiration.
- Ensure reagent containers are connected to the correct tubing and input ports.
- Ensure sinkers are on lines and lines are at bottom of containers.
- Ensure reagent lines are not crimped or clogged.
- INITIALIZE and PRIME instrument.
HGB Lyse Empty ?
YES
- Open Right Front Door and observe HGB/ WBC Syringe.
1
NO
YES
WBC Lyse Empty ?
NO
Diluent/Sheath Empty ?
YES
- Open Left Front Door and observe Diluent and Sheath Reservoirs.
2
NO
Total Call

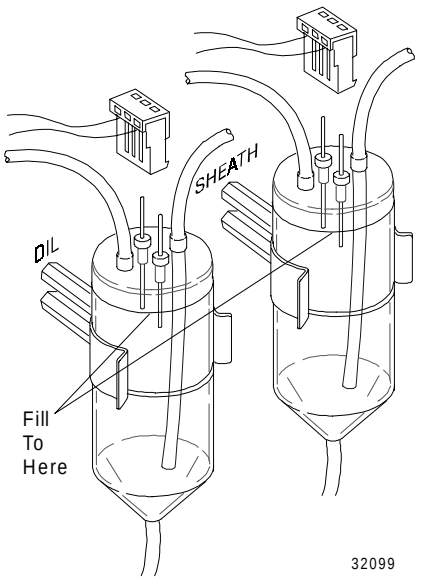
IP-7 Reagent Empty (Page 2 of 5)


1
From Main Menu, press
■ RUN
■ CLEAR FAULT
Syringe Moving Properly ?
YES
NO
- Clean/replace syringe (PL-7).
- Verify Syringe Driver operation (VP-6), (VP-7).
- Replace Syringe Driver Assembly (PL-7), (RR-11).
- Replace MPM (PL-11).
Syringe Filling Properly ?
YES
NO
- Verify operation and tubing in valves 28 for HGB, 23 for WBC. (VP-10) See Figure. Replace as necessary (PL-4.1), (TM-1).
- Replace SDM2 (PL-15)
- Verify operation and tubing in valves 24 for HGB, 25 for WBC. (VP-10) See Figure. Replace as necessary (PL-4.1), (TM-1).
- Replace SDM2 (PL-15).
- Remove Top Cover and observe Reagent Sensor Board. See Figure
- Inspect and seat connectors on J1 of Reagent Sensor Board and J26 of FCM.
- Replace FCM (PL-14.1).
Floss Tubing Up and Down Ensure Tubing is Seated in Slot
32098

IP-7 Reagent Empty (Page 3 of 5)



Note: The "Diluent/Sheath Empty" message can be generated by the In-line Diluent/Sheath Sensor, the Diluent Reservoir Level Sensor, or the Sheath Reservoir Level Sensor.



IP-7 Reagent Empty (Page 4 of 5)

3

- Remove Top Cover and observe Reagent Sensor Board. See Figure
- Inspect and seat connectors on J1 of Reagent Sensor Board and J26 of FCM.
- Replace FCM (PL-14.1).

4

- Ensure Diluent/Sheath plumbing is free of restrictions.
- Ensure there is no saline bridge at reservoir connectors.
- Verify the Vac 1 level (VP-16) and verify Vac 1 retention (VP-15).
- Ensure Vac 1 lines to reservoirs is free of restrictions.
- Verify operation of Valves 61, 62, 63, and 64 (VP-10). Replace as necessary (PL-4.1).
- Verify operation of Check Valves. Replace as necessary (TM-1).
- Verify Reservoirs are not cracked or leaking. Replace as necessary (PL-4.2).
- Replace FCM (PL-14.1).

5

- Ensure Vac 1 line to reservoir is free of restrictions.
- Ensure there is no saline bridge at reservoir connector.
- Verify operation of Valves 62 and 63 (VP-10). Replace as necessary (PL-4.1)
- Verify operation of Check Valve Replace as necessary (TM-1).
- Verify Reservoir is not cracked or leaking Replace as necessary (PL-4.2).
- Replace FCM (PL-14.1).

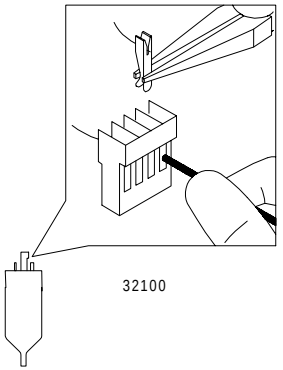
6

- Ensure Vac 1 line to reservoir is free of restrictions.
- Ensure there is no saline bridge at reservoir connector.
- Verify operation of Valves 61 and 64 (VP-10). Replace as necessary (PL-4.1).
- Verify operation of Check Valve. Replace as necessary (TM-1).
- Verify Reservoir is not cracked or leaking. Replace as necessary (PL-4.2).
- Replace FCM (PL-14.1).

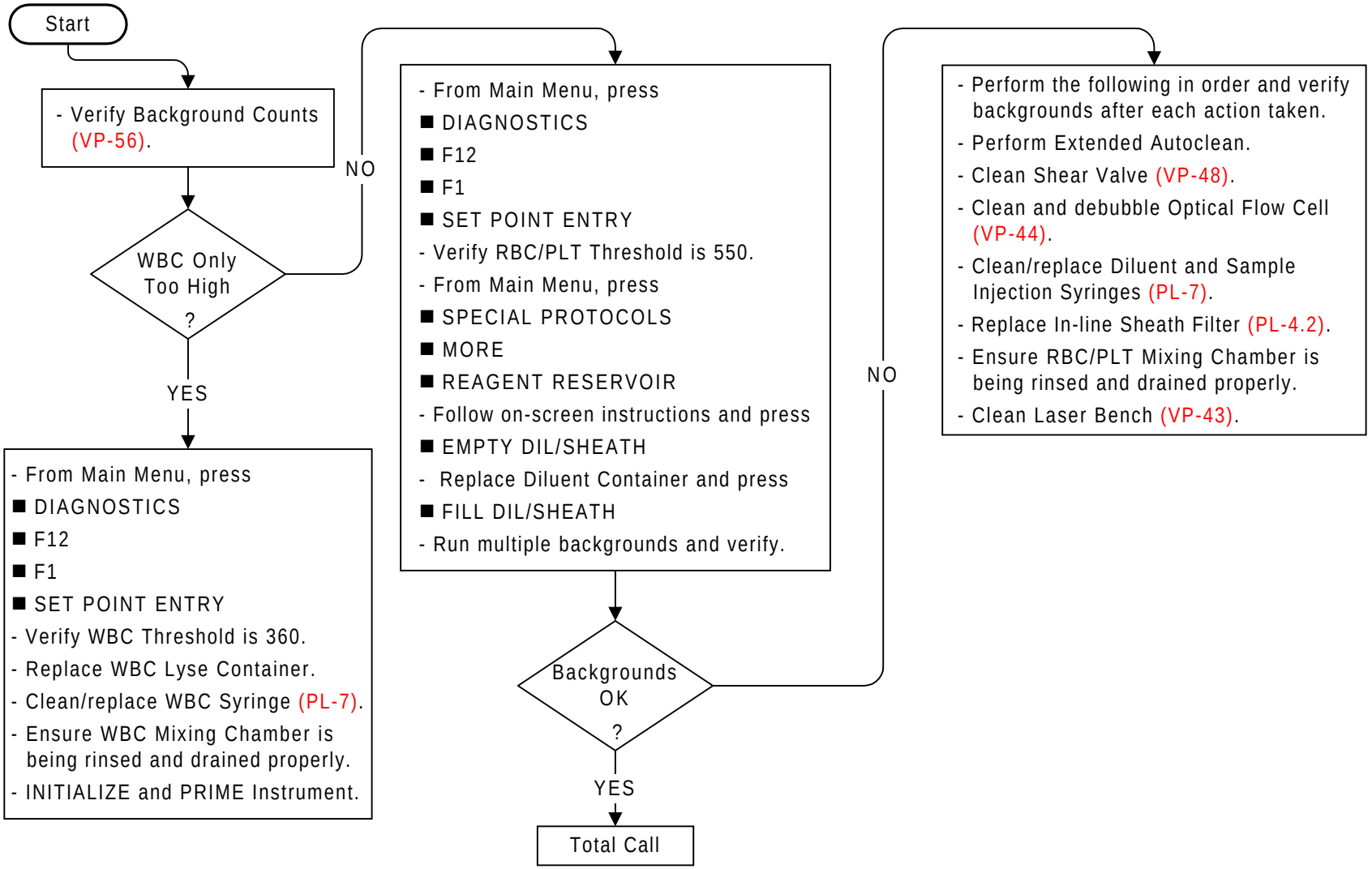
IP-7 Reagent Empty (Page 5 of 5)

7

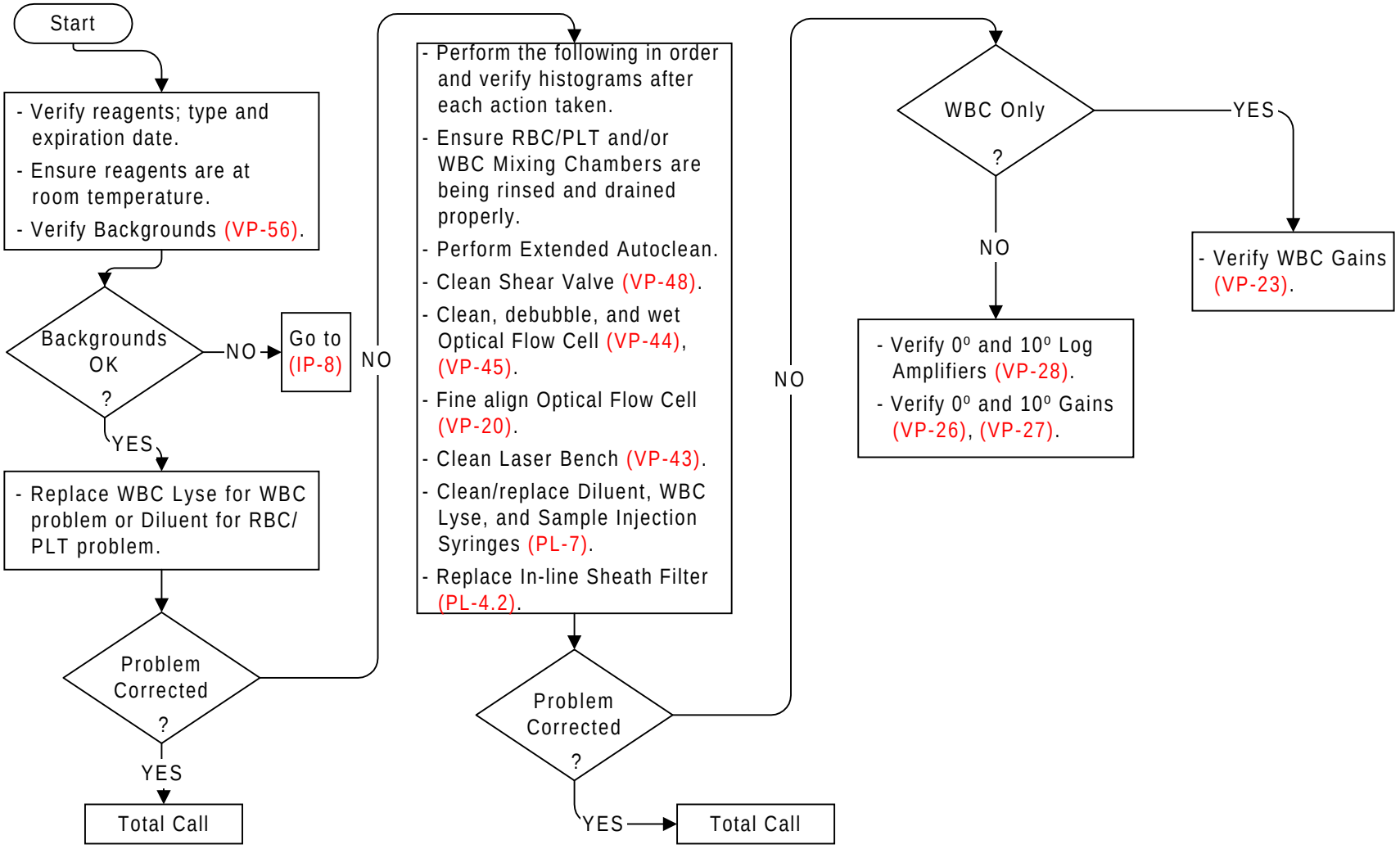
- Clean sensor contacts (Electrodes and connector) at top of Reservoir.
- Remove pins 1 and 4 and clean and crimp metal contacts so they are touching. See Figure
- If pins 1 and 4 are damaged, replace with pins 2 and 3.
- Reseat Sensor Cables (CDM 2 J8 for Diluent, or CDM 2 J10 for Sheath.
- Replace FCM (PL-14.1).



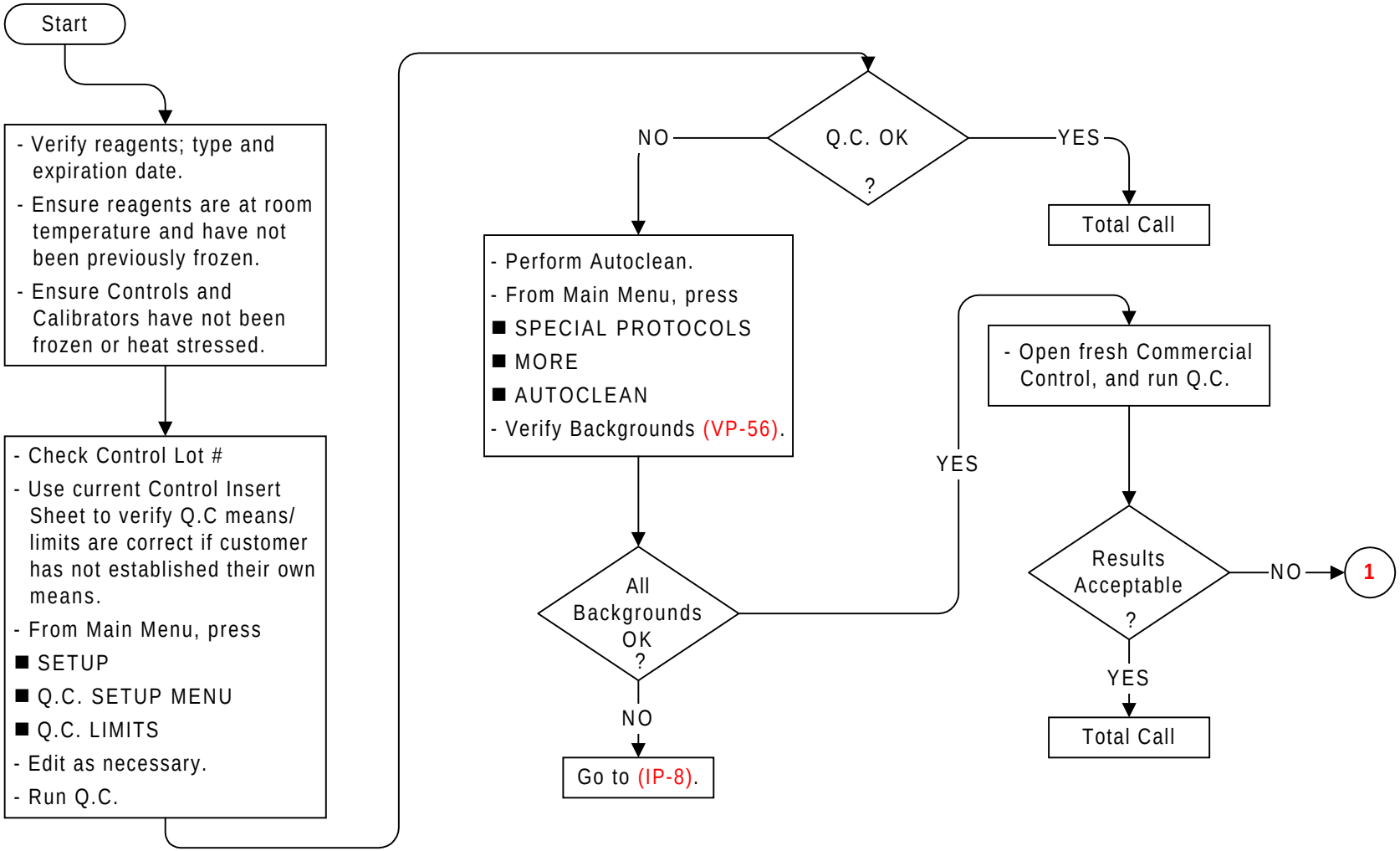
IP-8 Optical Backgrounds Too High (Page 1 of 1)


Start
- Verify Background Counts (VP-56).
WBC Only Too High ?
NO
YES
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify WBC Threshold is 360.
- Replace WBC Lyse Container.
- Clean/replace WBC Syringe (PL-7).
- Ensure WBC Mixing Chamber is being rinsed and drained properly.
- INITIALIZE and PRIME Instrument.
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify RBC/PLT Threshold is 550.
- From Main Menu, press
■ SPECIAL PROTOCOLS
■ MORE
■ REAGENT RESERVOIR
- Follow on-screen instructions and press
■ EMPTY DIL/SHEATH
- Replace Diluent Container and press
■ FILL DIL/SHEATH
- Run multiple backgrounds and verify.
Backgrounds OK ?
NO
YES
Total Call
- Perform the following in order and verify backgrounds after each action taken.
- Perform Extended Autoclean.
- Clean Shear Valve (VP-48).
- Clean and debubble Optical Flow Cell (VP-44).
- Clean/replace Diluent and Sample Injection Syringes (PL-7).
- Replace In-line Sheath Filter (PL-4.2).
- Ensure RBC/PLT Mixing Chamber is being rinsed and drained properly.
- Clean Laser Bench (VP-43).

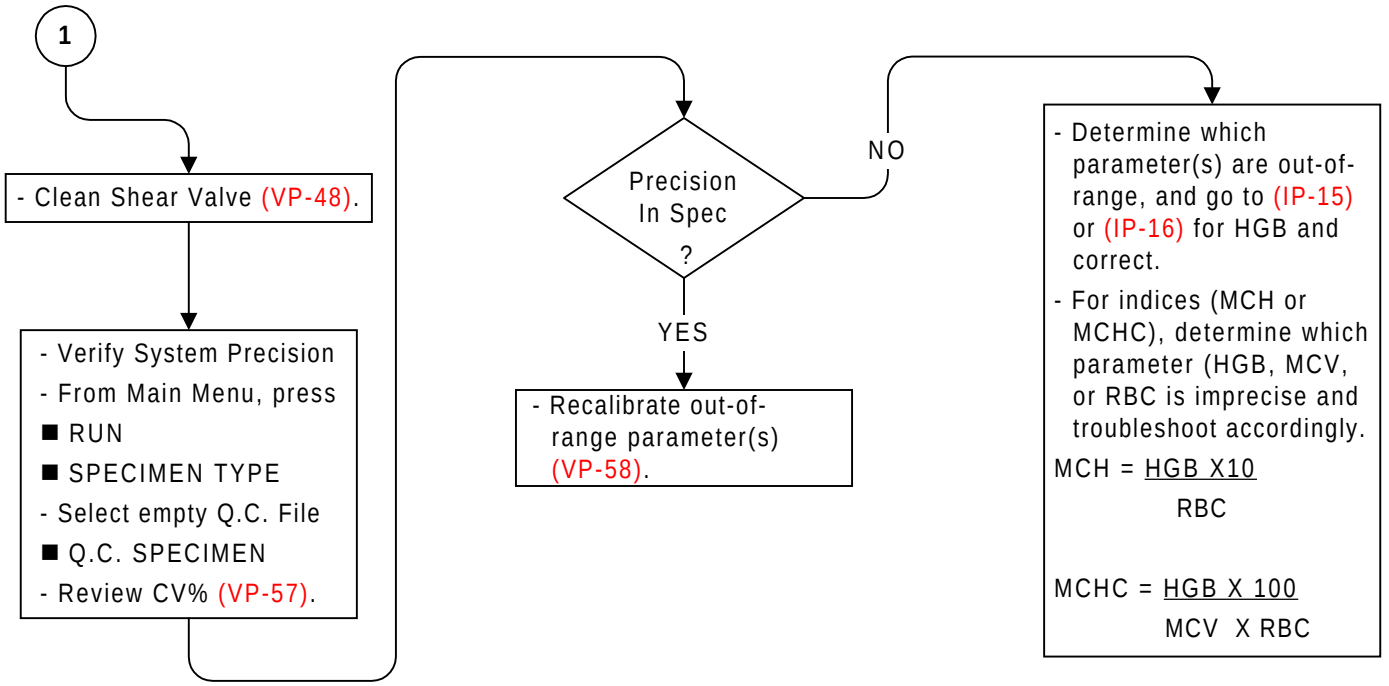
IP-9 Histogram Problems (Page 1 of 1)


Start
- Verify reagents; type and expiration date.
- Ensure reagents are at room temperature.
- Verify Backgrounds (VP-56).
Backgrounds OK ?
NO
Go to (IP-8)
YES
- Replace WBC Lyse for WBC problem or Diluent for RBC/PLT problem.
Problem Corrected ?
NO
YES
Total Call
- Perform the following in order and verify histograms after each action taken.
- Ensure RBC/PLT and/or WBC Mixing Chambers are being rinsed and drained properly.
- Perform Extended Autoclean.
- Clean Shear Valve (VP-48).
- Clean, debubble, and wet Optical Flow Cell (VP-44), (VP-45).
- Fine align Optical Flow Cell (VP-20).
- Clean Laser Bench (VP-43).
- Clean/replace Diluent, WBC Lyse, and Sample Injection Syringes (PL-7).
- Replace In-line Sheath Filter (PL-4.2).
Problem Corrected ?
NO
YES
Total Call
WBC Only ?
YES
- Verify WBC Gains (VP-23).
NO
- Verify 0° and 10° Log Amplifiers (VP-28).
- Verify 0° and 10° Gains (VP-26), (VP-27).

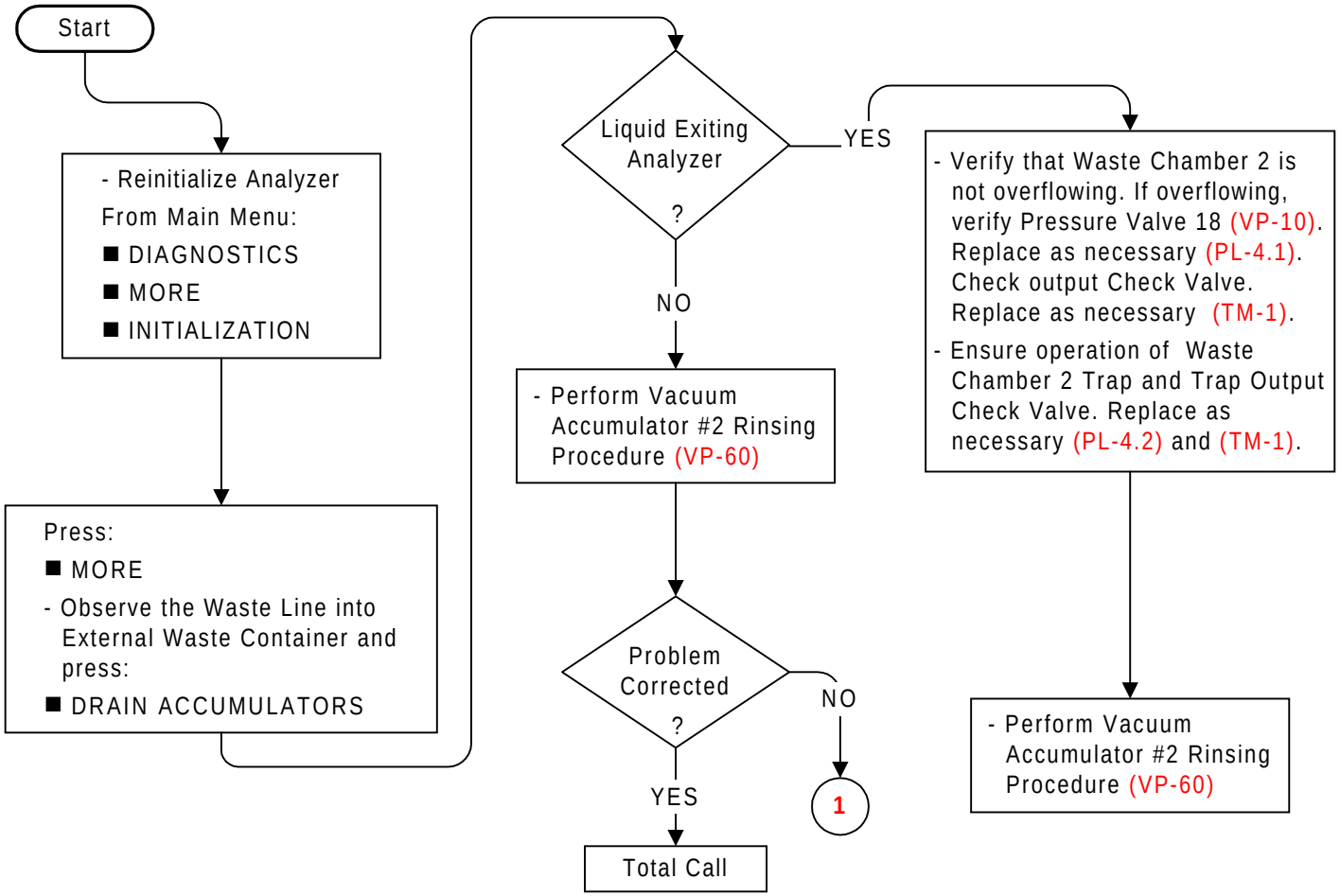
IP-10 Controls Out (Page 1 of 2)


Start
- Verify reagents; type and expiration date.
- Ensure reagents are at room temperature and have not been previously frozen.
- Ensure Controls and Calibrators have not been frozen or heat stressed.
- Check Control Lot #
- Use current Control Insert Sheet to verify Q.C means/ limits are correct if customer has not established their own means.
- From Main Menu, press
■ SETUP
■ Q.C. SETUP MENU
■ Q.C. LIMITS
- Edit as necessary.
- Run Q.C.
Q.C. OK ?
NO
YES
Total Call
- Perform Autoclean.
- From Main Menu, press
■ SPECIAL PROTOCOLS
■ MORE
■ AUTOCLEAN
- Verify Backgrounds (VP-56).
All Backgrounds OK ?
NO
Go to (IP-8).
YES
- Open fresh Commercial Control, and run Q.C.
Results Acceptable ?
NO
1
YES
Total Call

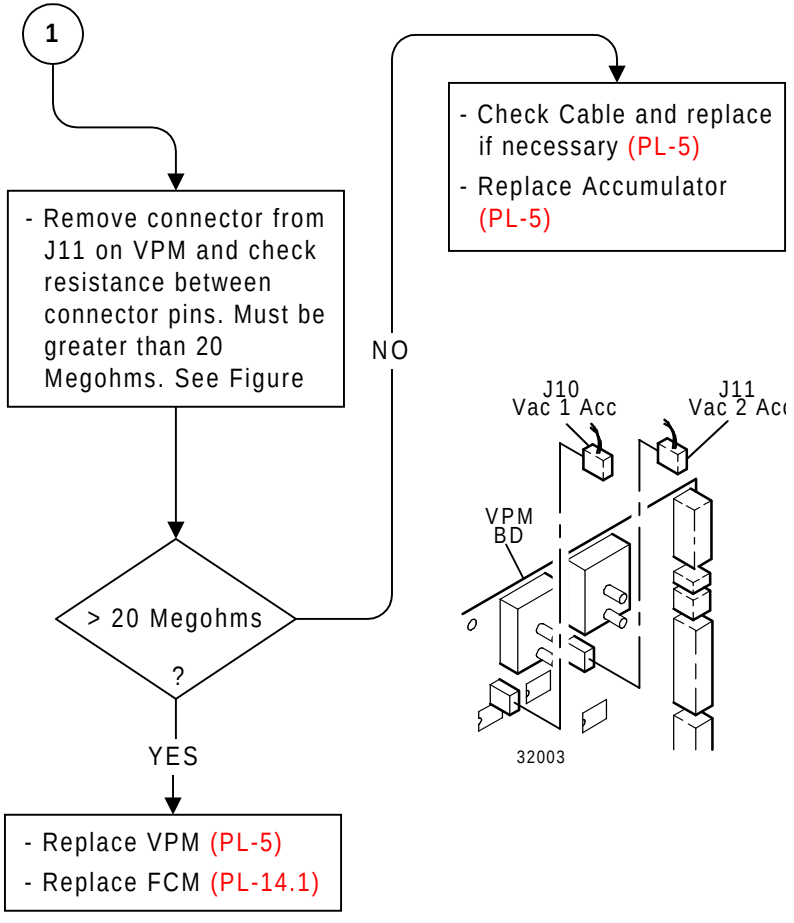
IP-10 Controls Out (Page 2 of 2)


1
- Clean Shear Valve (VP-48).
- Verify System Precision
- From Main Menu, press
■ RUN
■ SPECIMEN TYPE
- Select empty Q.C. File
■ Q.C. SPECIMEN
- Review CV% (VP-57).
Precision In Spec ?
NO
YES
- Recalibrate out-of-range parameter(s) (VP-58).
- Determine which parameter(s) are out-of-range, and go to (IP-15) or (IP-16) for HGB and correct.
- For indices (MCH or MCHC), determine which parameter (HGB, MCV, or RBC is imprecise and troubleshoot accordingly.
MCH = HGB X10 / RBC
MCHC = HGB X 100 / MCV X RBC

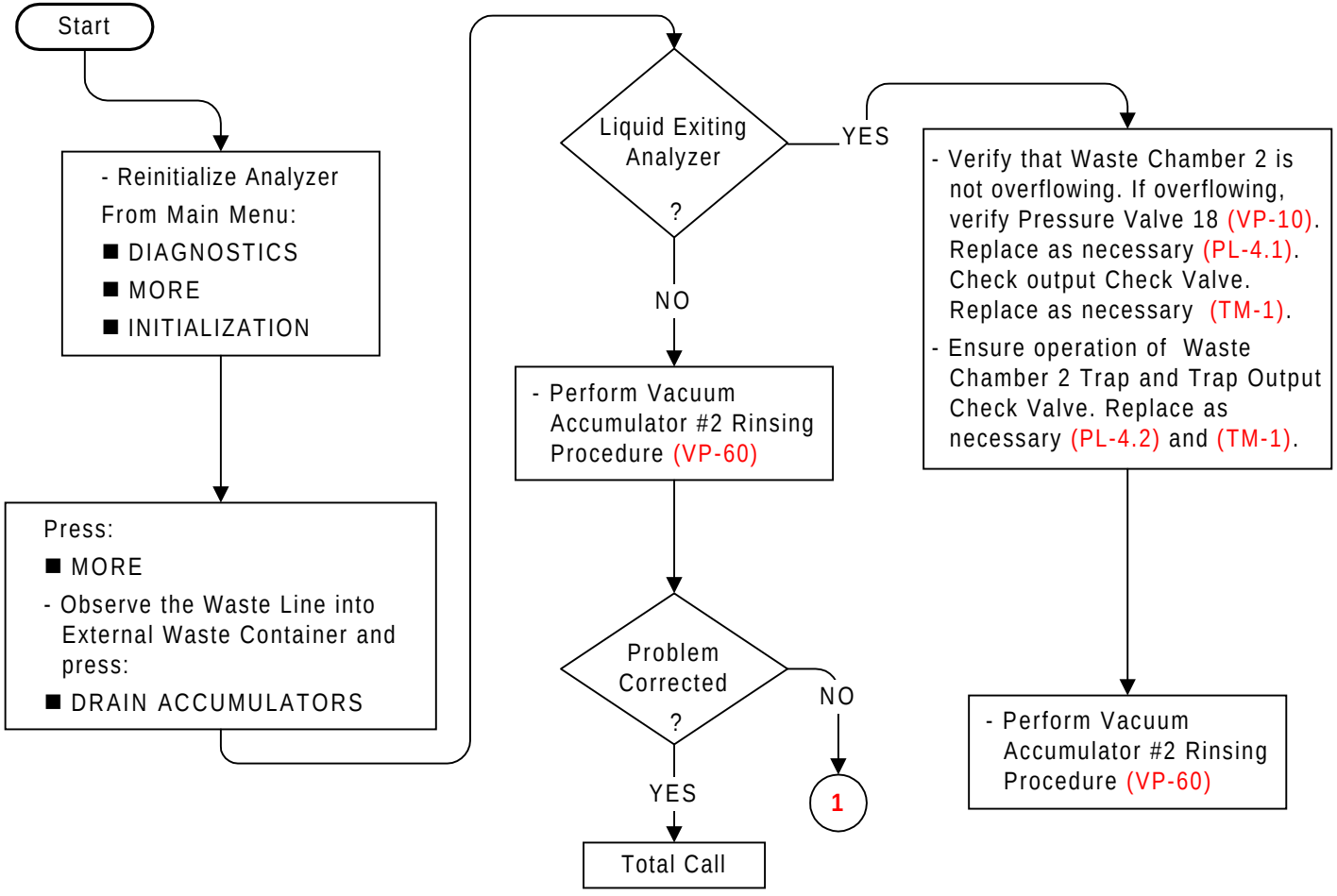
IP-11 Vacuum Accumulator #1 Wet (Page 1 of 2)


Start
- Reinitialize Analyzer
From Main Menu:
■ DIAGNOSTICS
■ MORE
■ INITIALIZATION
Press:
■ MORE
- Observe the Waste Line into External Waste Container and press:
■ DRAIN ACCUMULATORS
Liquid Exiting Analyzer ?
YES
NO
- Verify that Waste Chamber 2 is not overflowing. If overflowing, verify Pressure Valve 18 (VP-10). Replace as necessary (PL-4.1). Check output Check Valve. Replace as necessary (TM-1).
- Ensure operation of Waste Chamber 2 Trap and Trap Output Check Valve. Replace as necessary (PL-4.2) and (TM-1).
- Perform Vacuum Accumulator #2 Rinsing Procedure (VP-60)
Problem Corrected ?
NO
YES
1
Total Call
- Perform Vacuum Accumulator #2 Rinsing Procedure (VP-60)

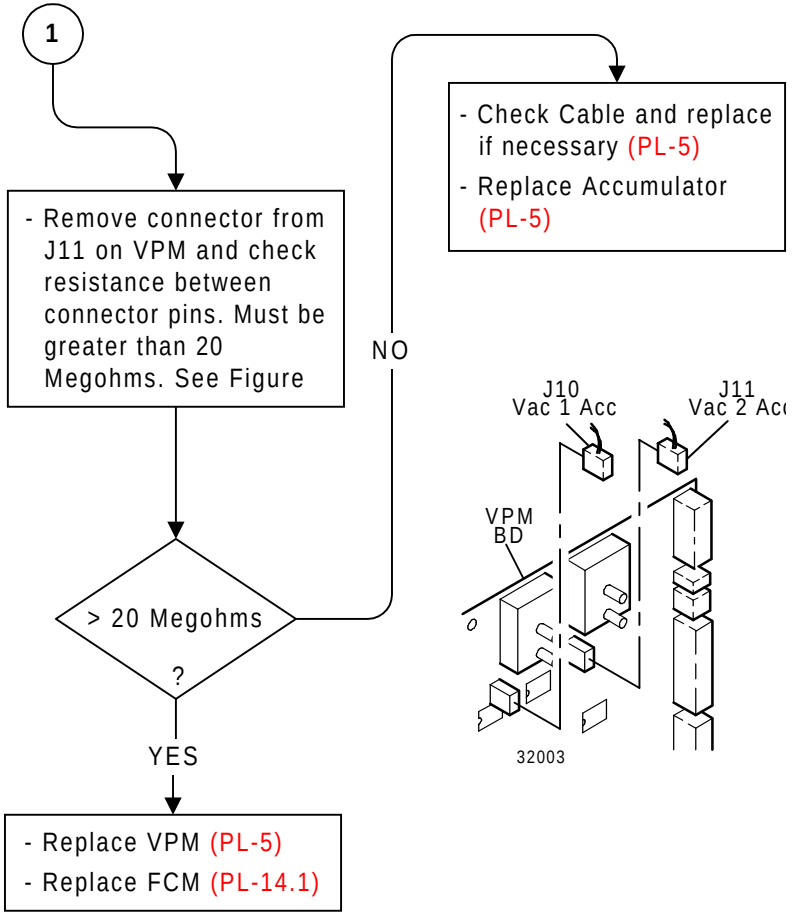
IP-11 Vacuum Accumulator #1 Wet (Page 2 of 2)


1
- Remove connector from J11 on VPM and check resistance between connector pins. Must be greater than 20 Megohms. See Figure
> 20 Megohms ?
NO
- Check Cable and replace if necessary (PL-5)
- Replace Accumulator (PL-5)
YES
- Replace VPM (PL-5)
- Replace FCM (PL-14.1)
J10 Vac 1 Acc
J11 Vac 2 Acc
VPM BD
32003

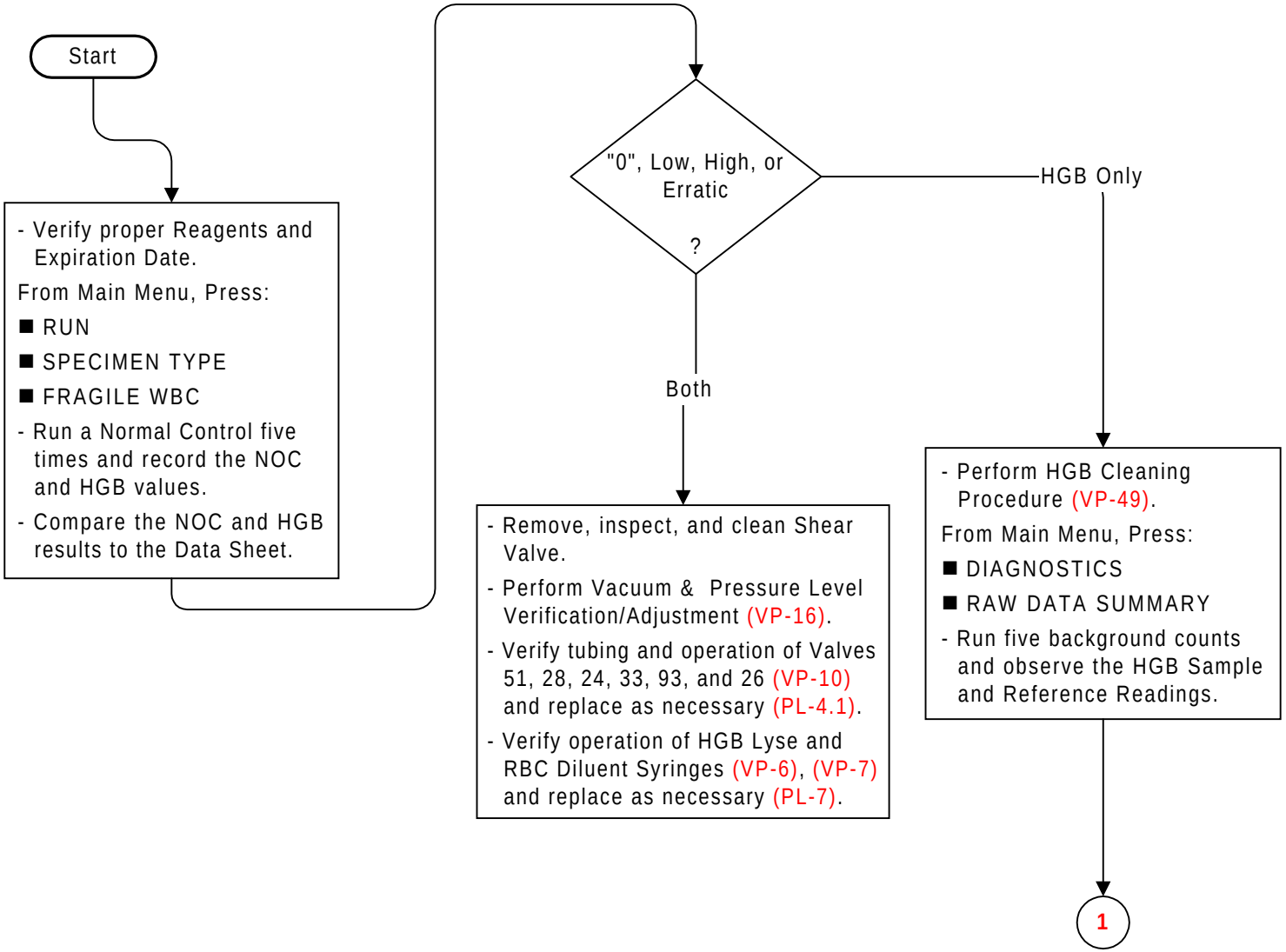
IP-12 Vacuum Accumulator #2 Wet (Page 1 of 2)


Start
- Reinitialize Analyzer
From Main Menu:
■ DIAGNOSTICS
■ MORE
■ INITIALIZATION
Press:
■ MORE
- Observe the Waste Line into External Waste Container and press:
■ DRAIN ACCUMULATORS
Liquid Exiting Analyzer ?
YES
NO
- Verify that Waste Chamber 2 is not overflowing. If overflowing, verify Pressure Valve 18 (VP-10). Replace as necessary (PL-4.1). Check output Check Valve. Replace as necessary (TM-1).
- Ensure operation of Waste Chamber 2 Trap and Trap Output Check Valve. Replace as necessary (PL-4.2) and (TM-1).
- Perform Vacuum Accumulator #2 Rinsing Procedure (VP-60)
Problem Corrected ?
NO
YES
1
- Perform Vacuum Accumulator #2 Rinsing Procedure (VP-60)
Total Call

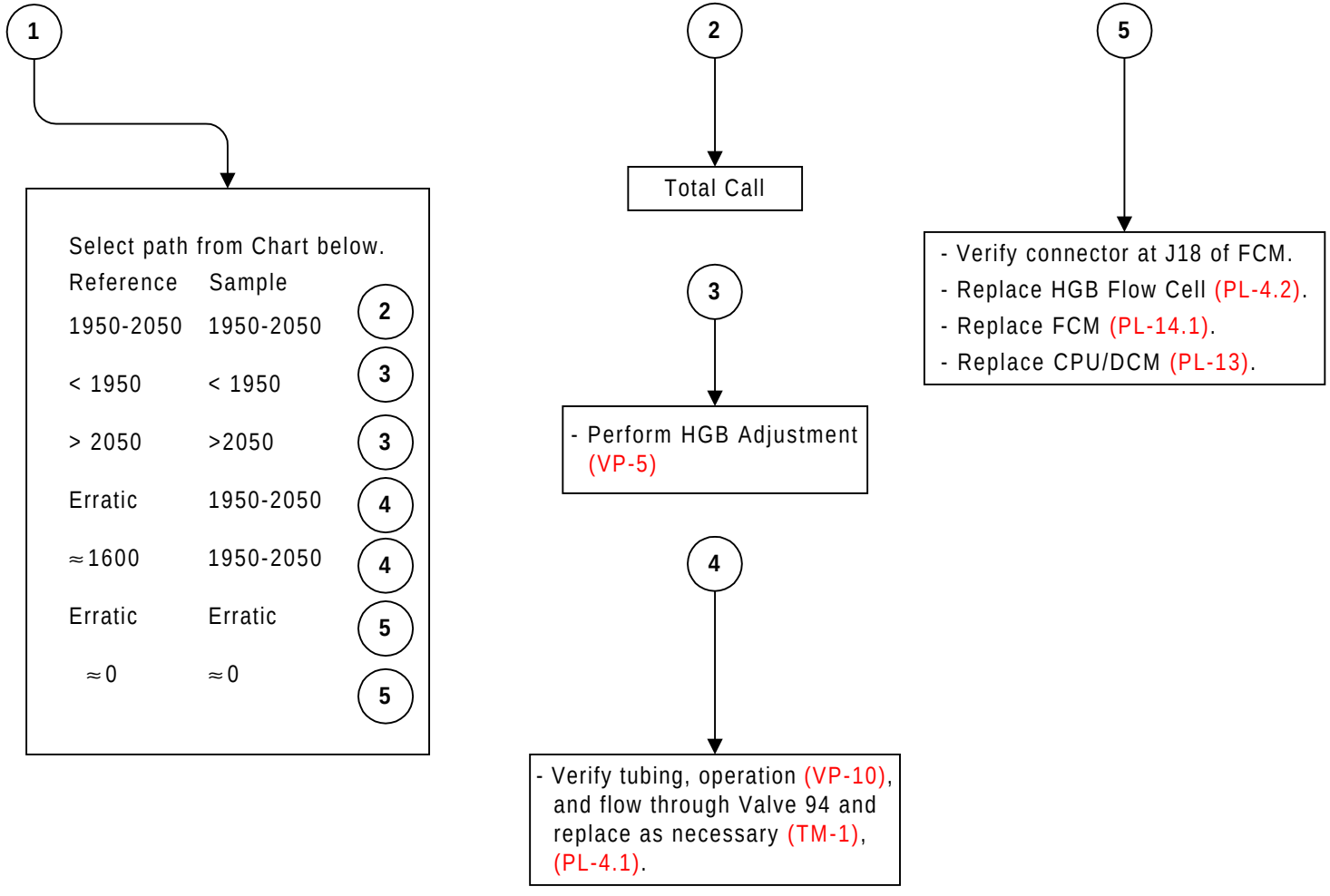
IP-12 Vacuum Accumulator #2 Wet (Page 2 of 2)


1
- Remove connector from J11 on VPM and check resistance between connector pins. Must be greater than 20 Megohms. See Figure
> 20 Megohms ?
NO
- Check Cable and replace if necessary (PL-5)
- Replace Accumulator (PL-5)
YES
- Replace VPM (PL-5)
- Replace FCM (PL-14.1)
J10 Vac 1 Acc
J11 Vac 2 Acc
VPM BD
32003

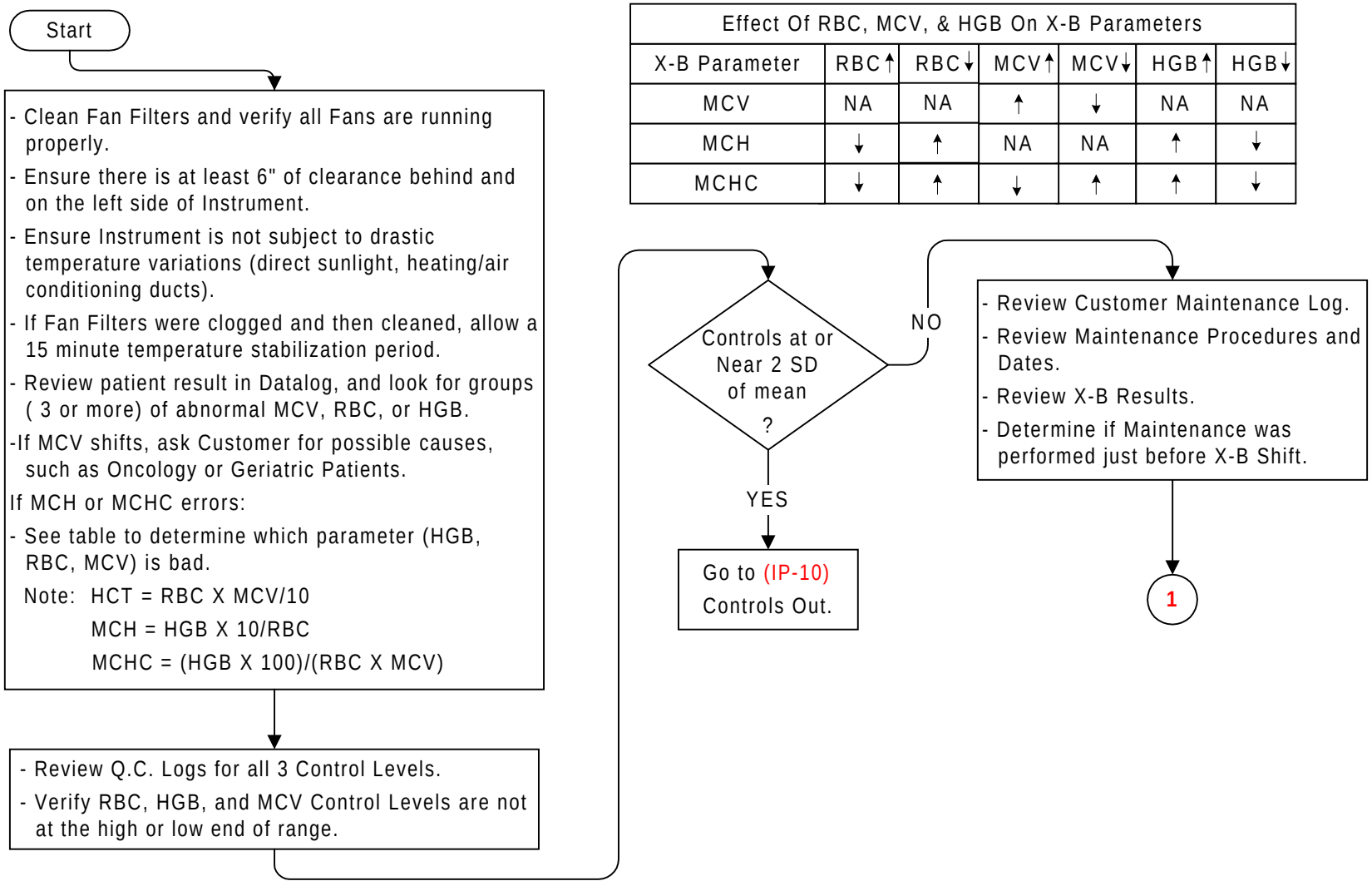
IP-13 HGB Problems (Page 1 of 2)


Start
- Verify proper Reagents and Expiration Date.
From Main Menu, Press:
■ RUN
■ SPECIMEN TYPE
■ FRAGILE WBC
- Run a Normal Control five times and record the NOC and HGB values.
- Compare the NOC and HGB results to the Data Sheet.
"0", Low, High, or Erratic
?
HGB Only
Both
- Remove, inspect, and clean Shear Valve.
- Perform Vacuum & Pressure Level Verification/Adjustment (VP-16).
- Verify tubing and operation of Valves 51, 28, 24, 33, 93, and 26 (VP-10) and replace as necessary (PL-4.1).
- Verify operation of HGB Lyse and RBC Diluent Syringes (VP-6), (VP-7) and replace as necessary (PL-7).
- Perform HGB Cleaning Procedure (VP-49).
From Main Menu, Press:
■ DIAGNOSTICS
■ RAW DATA SUMMARY
- Run five background counts and observe the HGB Sample and Reference Readings.
1

IP-13 HGB Problems (Page 2 of 2)

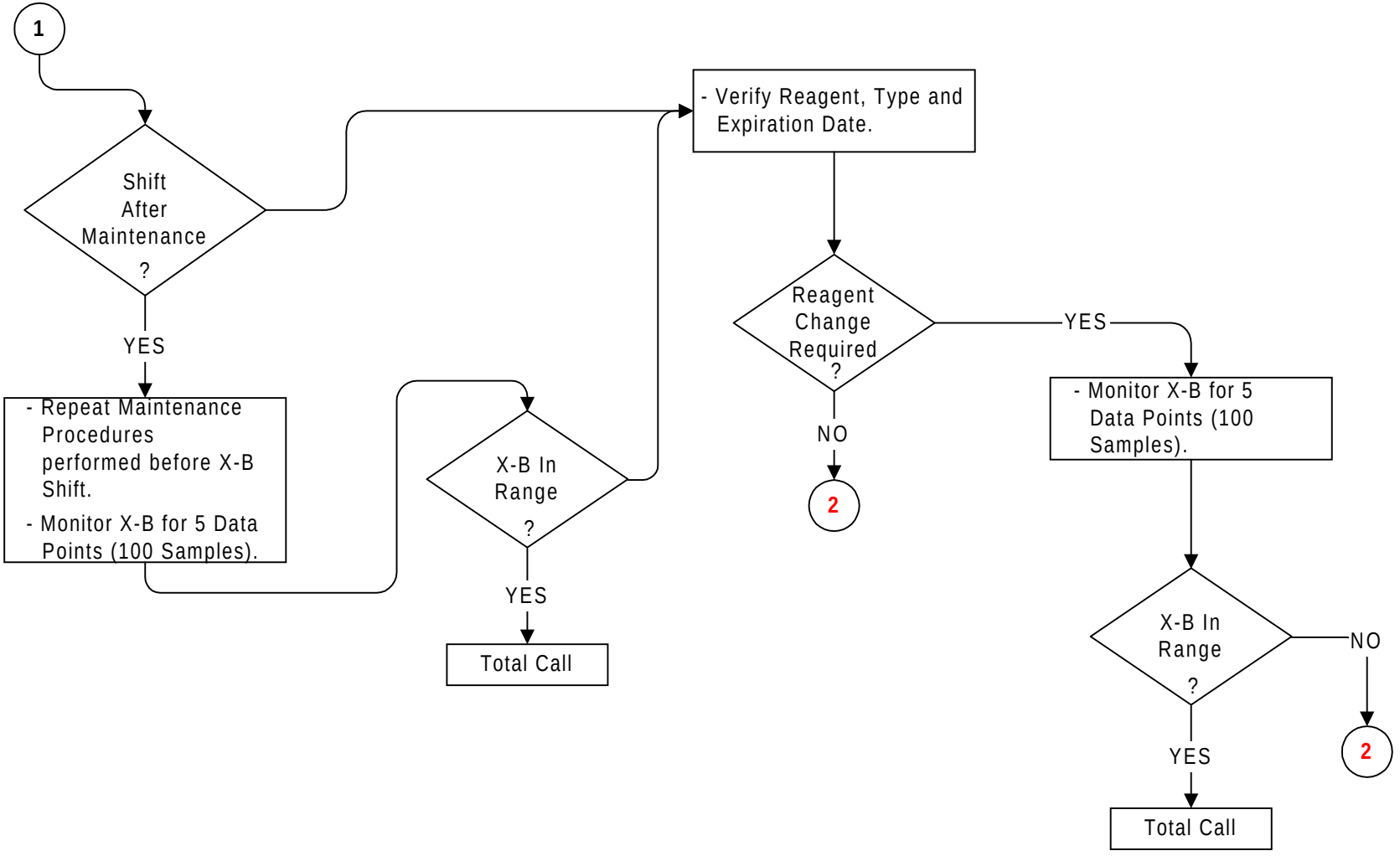


IP-14 X-B Errors (Page 1 of 3)

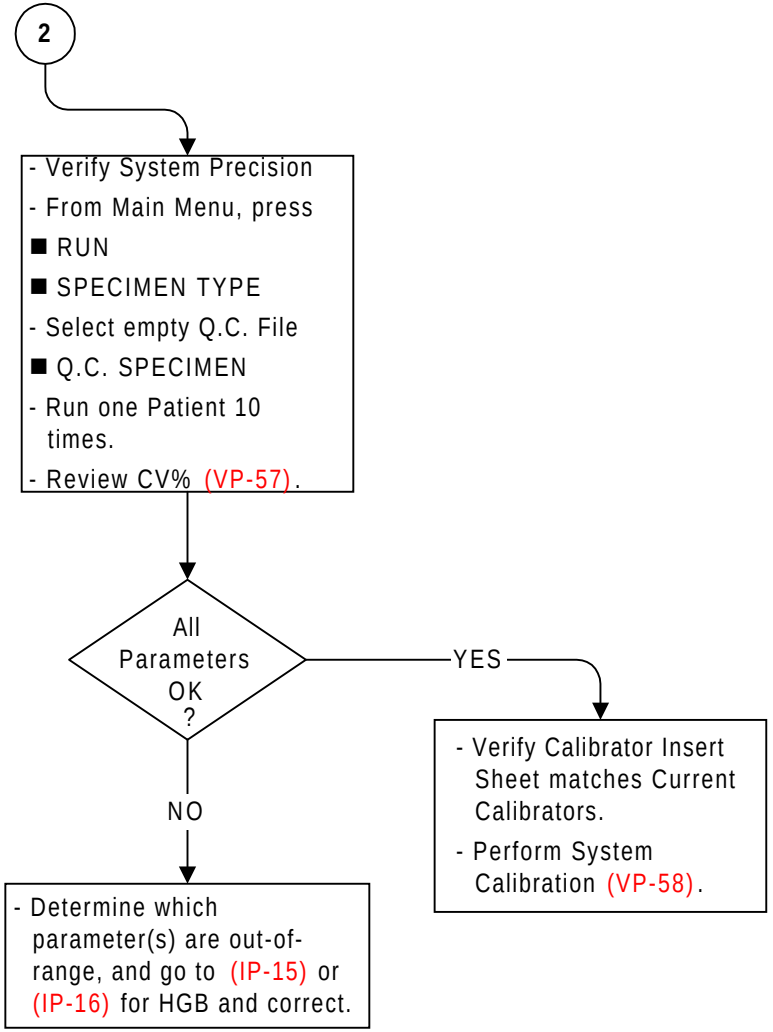

Start
- Clean Fan Filters and verify all Fans are running properly.
- Ensure there is at least 6" of clearance behind and on the left side of Instrument.
- Ensure Instrument is not subject to drastic temperature variations (direct sunlight, heating/air conditioning ducts).
- If Fan Filters were clogged and then cleaned, allow a 15 minute temperature stabilization period.
- Review patient result in Datalog, and look for groups (3 or more) of abnormal MCV, RBC, or HGB.
-If MCV shifts, ask Customer for possible causes, such as Oncology or Geriatric Patients.
If MCH or MCHC errors:
- See table to determine which parameter (HGB, RBC, MCV) is bad.
Note: HCT = RBC X MCV/10
MCH = HGB X 10/RBC
MCHC = (HGB X 100)/(RBC X MCV)
- Review Q.C. Logs for all 3 Control Levels.
- Verify RBC, HGB, and MCV Control Levels are not at the high or low end of range.
Controls at or Near 2 SD of mean ?
NO
YES
Go to (IP-10) Controls Out.
- Review Customer Maintenance Log.
- Review Maintenance Procedures and Dates.
- Review X-B Results.
- Determine if Maintenance was performed just before X-B Shift.
1

Effect Of RBC, MCV, & HGB On X-B Parameters						
X-B Parameter	RBC ↑	RBC ↓	MCV ↑	MCV ↓	HGB ↑	HGB ↓
MCV	NA	NA	↑	↓	NA	NA
MCH	↓	↑	NA	NA	↑	↓
MCHC	↓	↑	↓	↑	↑	↓

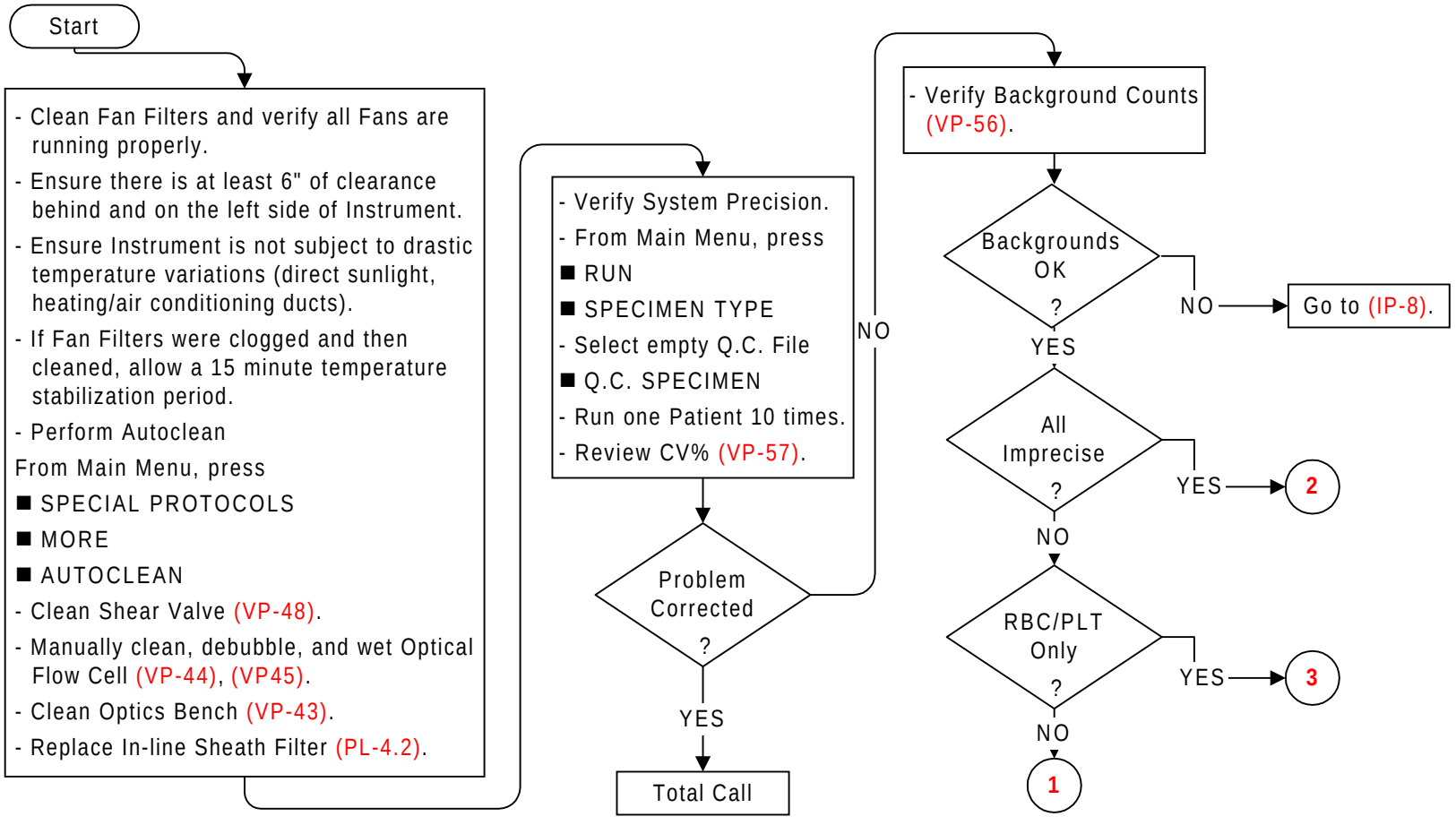
IP-14 X-B Errors (Page 2 of 3)



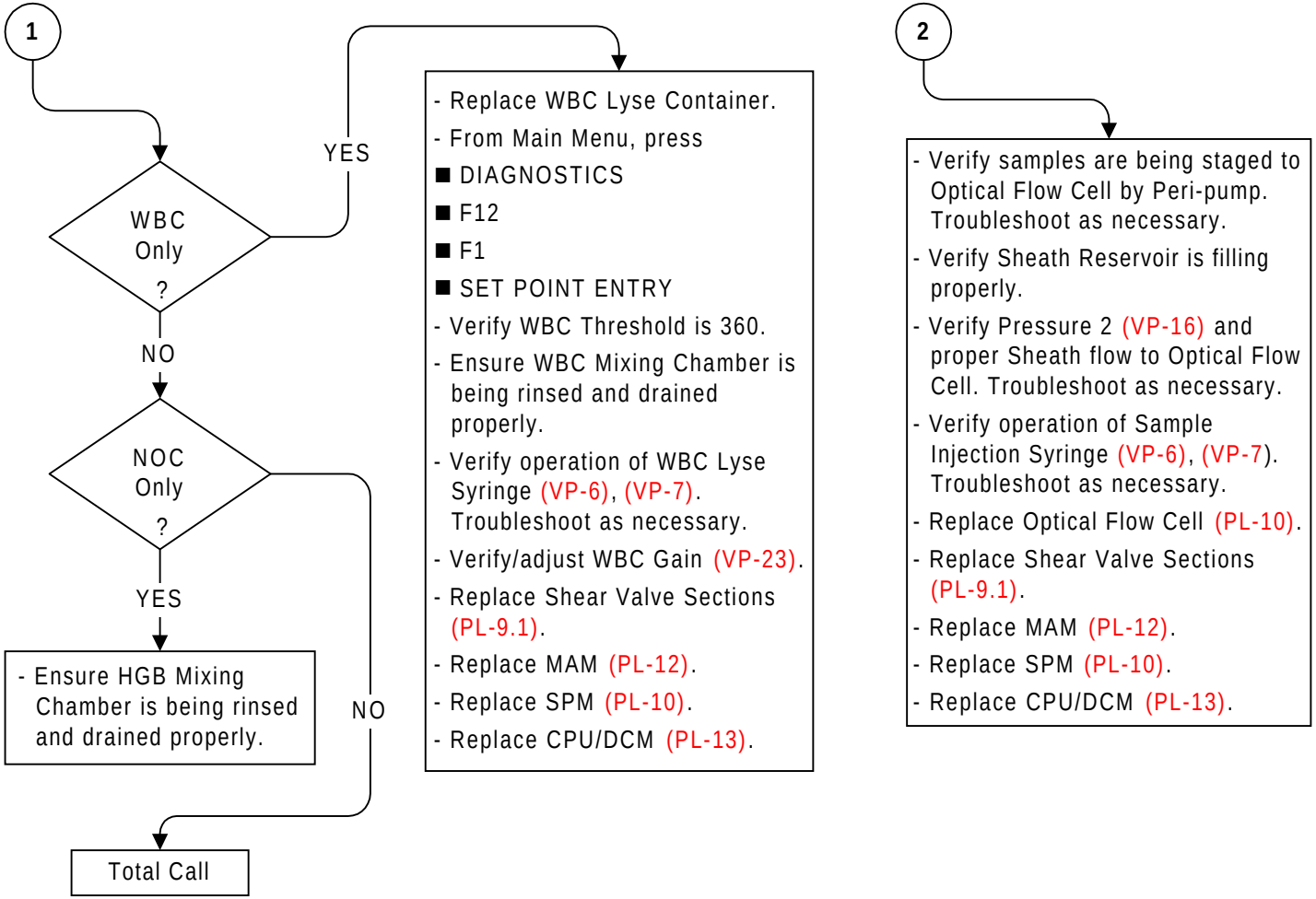
IP-14 X-B Errors (Page 3 of 3)


2
- Verify System Precision
- From Main Menu, press
■ RUN
■ SPECIMEN TYPE
- Select empty Q.C. File
■ Q.C. SPECIMEN
- Run one Patient 10 times.
- Review CV% (VP-57).
All Parameters OK ?
YES
NO
- Verify Calibrator Insert Sheet matches Current Calibrators.
- Perform System Calibration (VP-58).
- Determine which parameter(s) are out-of-range, and go to (IP-15) or (IP-16) for HGB and correct.

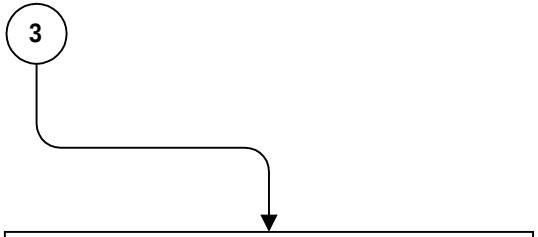
IP-15 Optical Parameters Imprecision (Page 1 of 3)


Start
- Clean Fan Filters and verify all Fans are running properly.
- Ensure there is at least 6" of clearance behind and on the left side of Instrument.
- Ensure Instrument is not subject to drastic temperature variations (direct sunlight, heating/air conditioning ducts).
- If Fan Filters were clogged and then cleaned, allow a 15 minute temperature stabilization period.
- Perform Autoclean
From Main Menu, press
■ SPECIAL PROTOCOLS
■ MORE
■ AUTOCLEAN
- Clean Shear Valve (VP-48).
- Manually clean, debubble, and wet Optical Flow Cell (VP-44), (VP45).
- Clean Optics Bench (VP-43).
- Replace In-line Sheath Filter (PL-4.2).
- Verify System Precision.
- From Main Menu, press
■ RUN
■ SPECIMEN TYPE
- Select empty Q.C. File
■ Q.C. SPECIMEN
- Run one Patient 10 times.
- Review CV% (VP-57).
Problem Corrected ?
NO
YES
Total Call
- Verify Background Counts (VP-56).
Backgrounds OK ?
NO
Go to (IP-8).
YES
All Imprecise ?
YES
2
NO
RBC/PLT Only ?
YES
3
NO
1

IP-15 Optical Parameters Imprecision (Page 2 of 3)

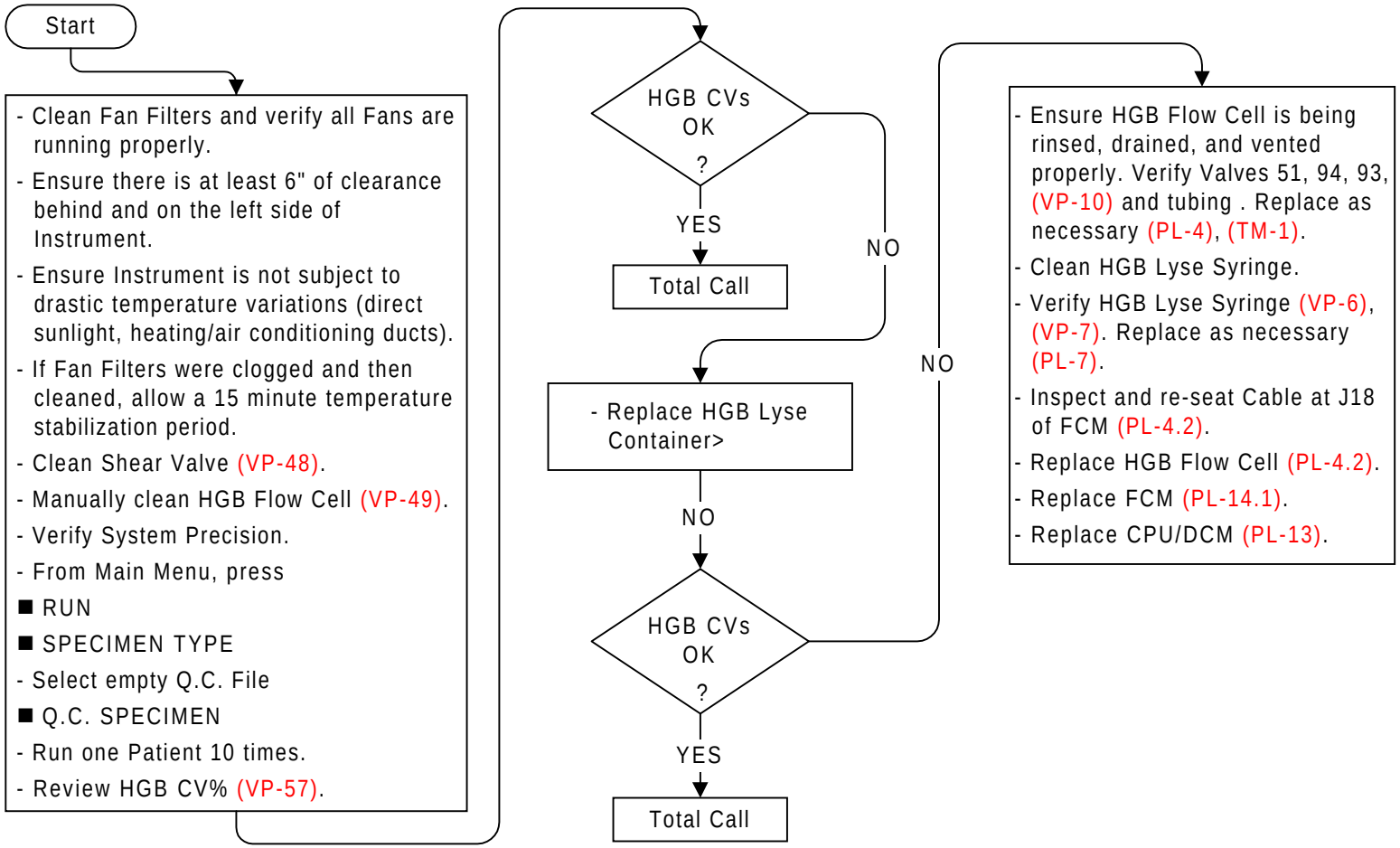

1
WBC Only ?
YES
NO
NOC Only ?
YES
- Ensure HGB Mixing Chamber is being rinsed and drained properly.
NO
Total Call
- Replace WBC Lyse Container.
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify WBC Threshold is 360.
- Ensure WBC Mixing Chamber is being rinsed and drained properly.
- Verify operation of WBC Lyse Syringe (VP-6), (VP-7). Troubleshoot as necessary.
- Verify/adjust WBC Gain (VP-23).
- Replace Shear Valve Sections (PL-9.1).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
2
- Verify samples are being staged to Optical Flow Cell by Peri-pump. Troubleshoot as necessary.
- Verify Sheath Reservoir is filling properly.
- Verify Pressure 2 (VP-16) and proper Sheath flow to Optical Flow Cell. Troubleshoot as necessary.
- Verify operation of Sample Injection Syringe (VP-6), (VP-7). Troubleshoot as necessary.
- Replace Optical Flow Cell (PL-10).
- Replace Shear Valve Sections (PL-9.1).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).

IP-15 Optical Parameters Imprecision (Page 3 of 3)

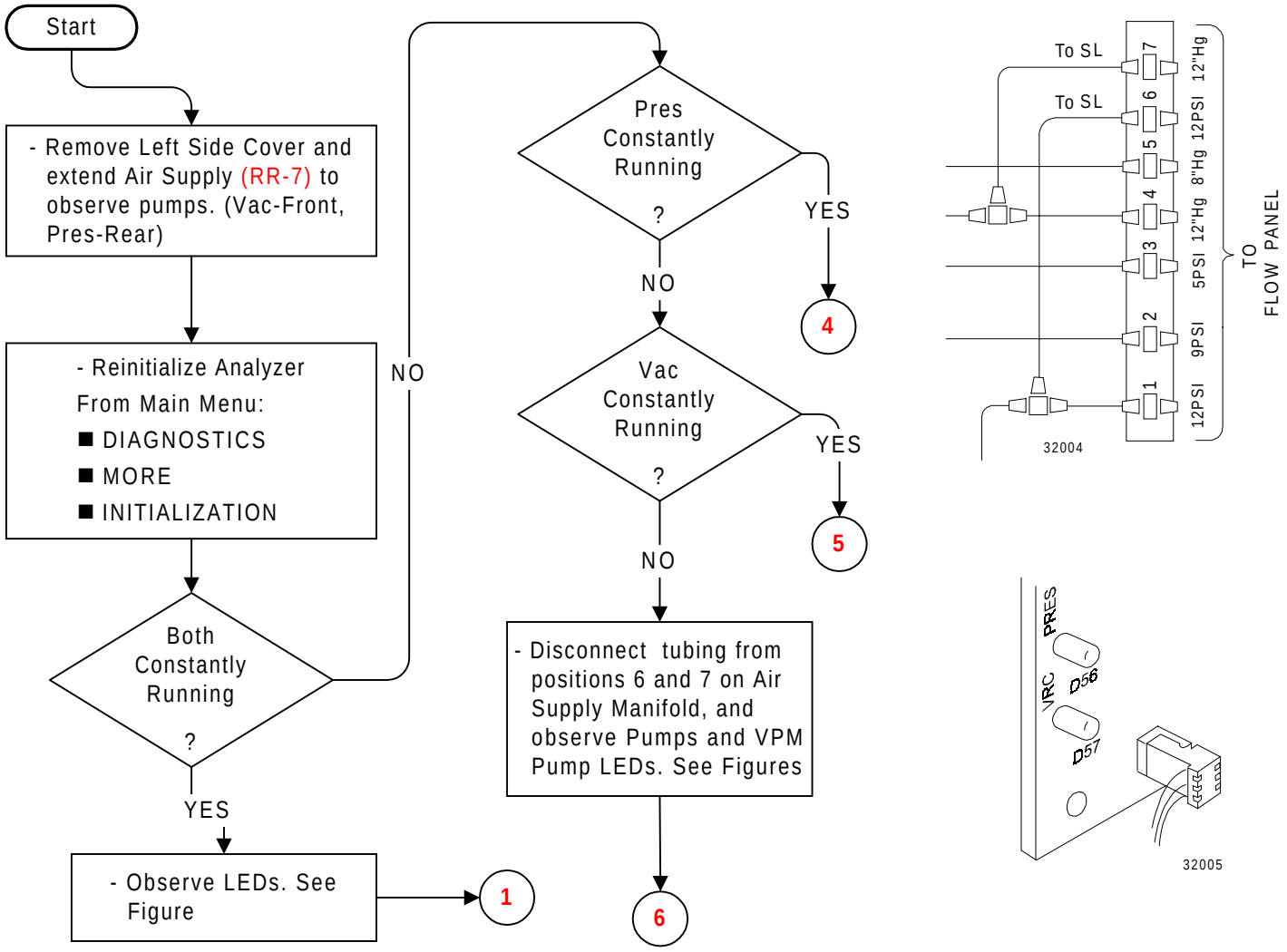


- Replace Diluent Container.
- From Main Menu, press
  - DIAGNOSTICS
  - F12
  - F1
  - SET POINT ENTRY
- Verify RBC/PLT Threshold is 550.
- Ensure RBC/PLT Mixing Chamber is being rinsed and drained properly.
- Verify 0^{o} and 10^{o} Log Amplifiers (VP-28).
- Verify 0^{o} and 10^{o} Gain (VP-26), (VP-27).
- Replace Shear Valve Sections (PL-9.1).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).

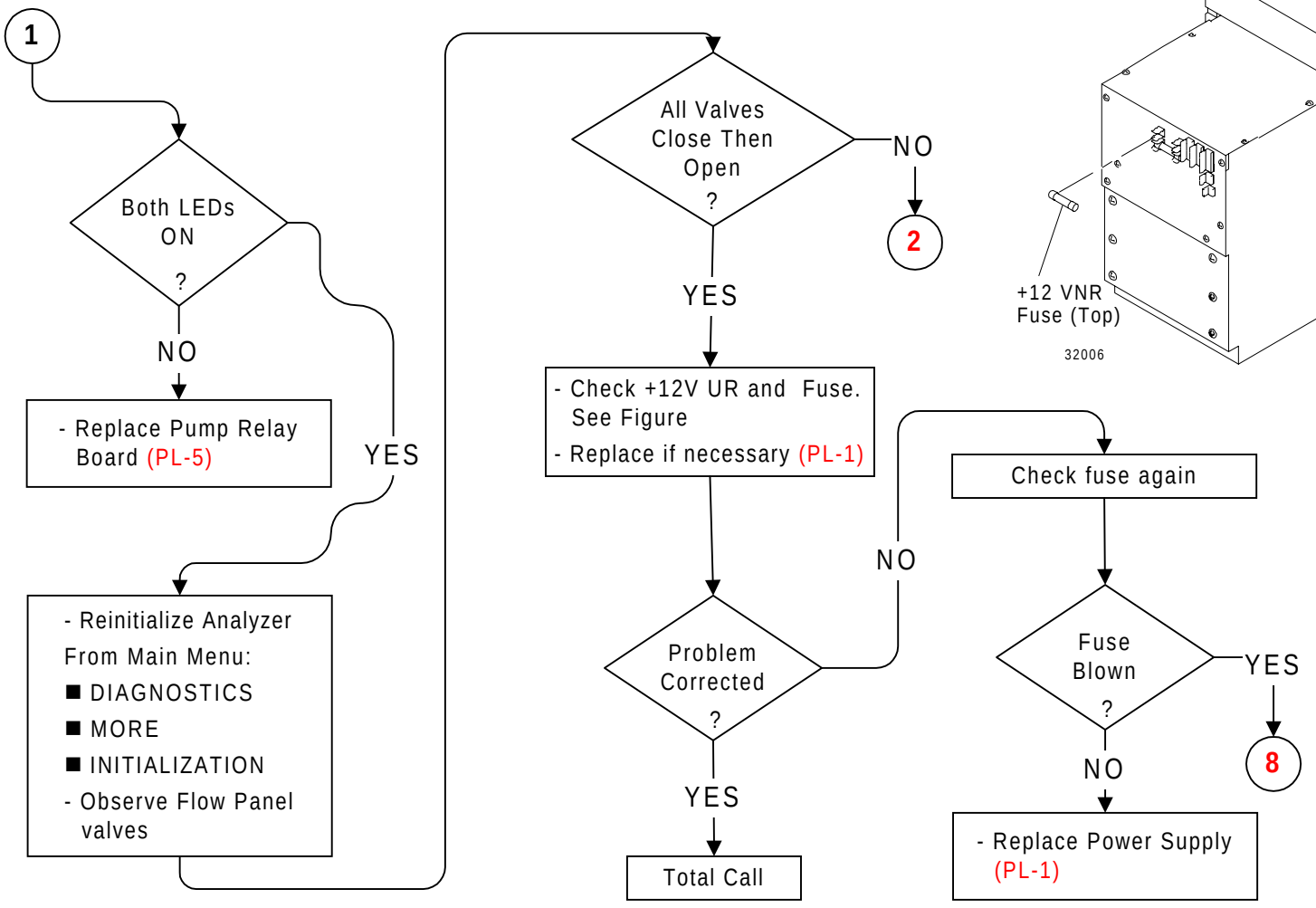
IP-16 HGB Imprecision (Page 1 of 1)


Start
- Clean Fan Filters and verify all Fans are running properly.
- Ensure there is at least 6" of clearance behind and on the left side of Instrument.
- Ensure Instrument is not subject to drastic temperature variations (direct sunlight, heating/air conditioning ducts).
- If Fan Filters were clogged and then cleaned, allow a 15 minute temperature stabilization period.
- Clean Shear Valve (VP-48).
- Manually clean HGB Flow Cell (VP-49).
- Verify System Precision.
- From Main Menu, press
■ RUN
■ SPECIMEN TYPE
- Select empty Q.C. File
■ Q.C. SPECIMEN
- Run one Patient 10 times.
- Review HGB CV% (VP-57).
HGB CVs OK ?
YES
Total Call
NO
- Replace HGB Lyse Container>
NO
HGB CVs OK ?
YES
Total Call
NO
- Ensure HGB Flow Cell is being rinsed, drained, and vented properly. Verify Valves 51, 94, 93, (VP-10) and tubing . Replace as necessary (PL-4), (TM-1).
- Clean HGB Lyse Syringe.
- Verify HGB Lyse Syringe (VP-6), (VP-7). Replace as necessary (PL-7).
- Inspect and re-seat Cable at J18 of FCM (PL-4.2).
- Replace HGB Flow Cell (PL-4.2).
- Replace FCM (PL-14.1).
- Replace CPU/DCM (PL-13).

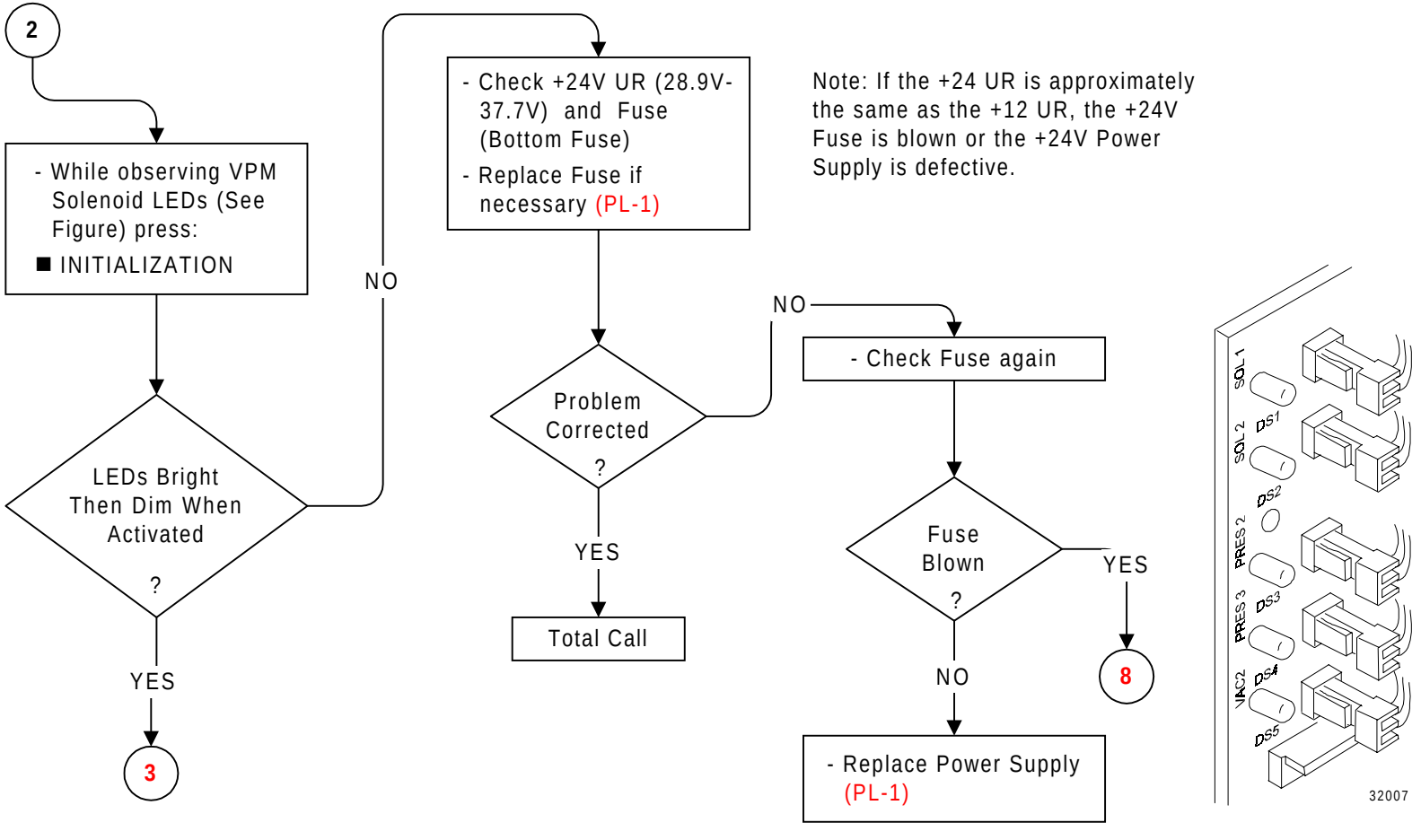
IP-17 Primary Vacuum/Pressure Isolation, (Page 1 of 9)



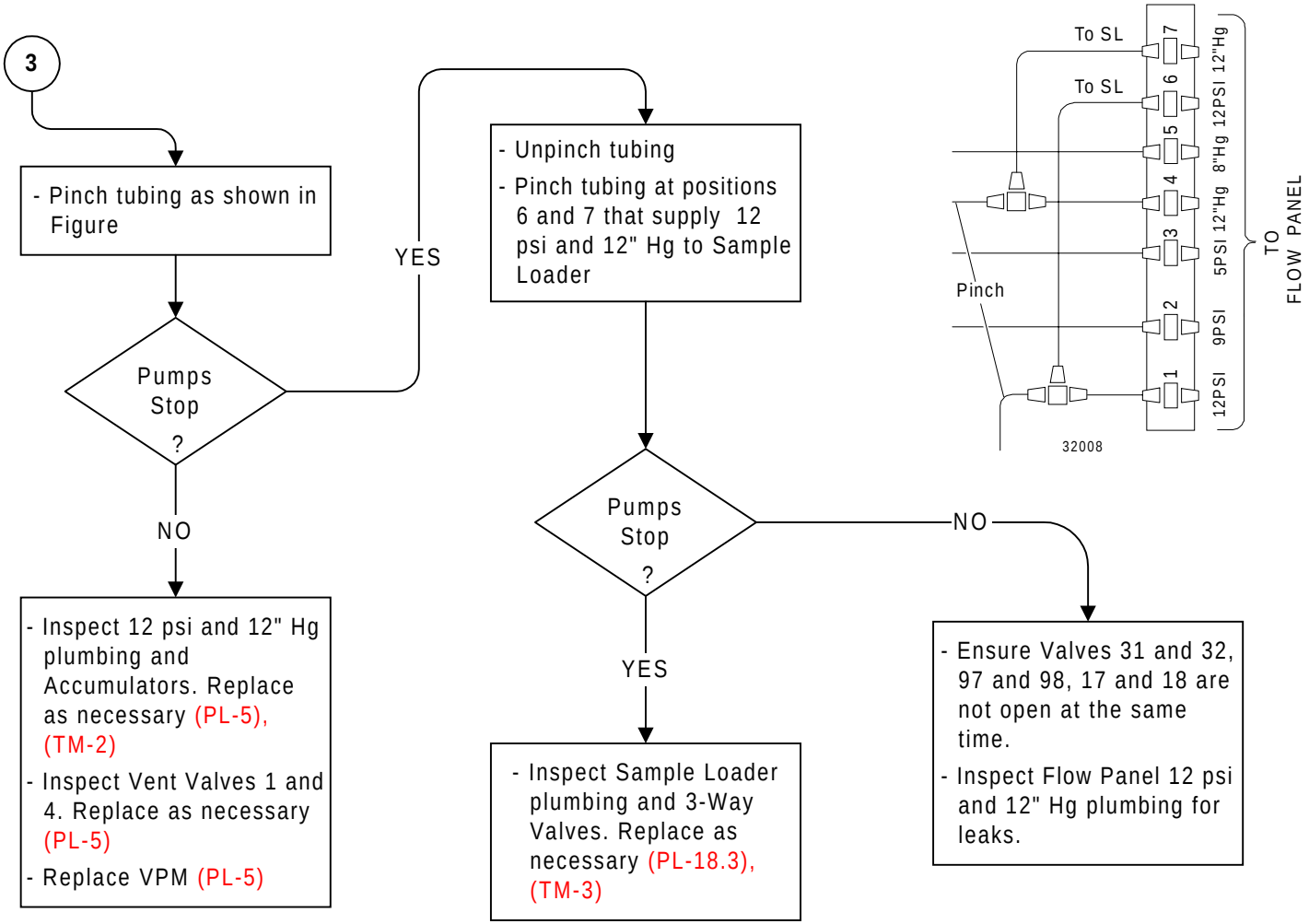
IP-17 Primary Vacuum/Pressure Isolation, (Page 2 of 9)



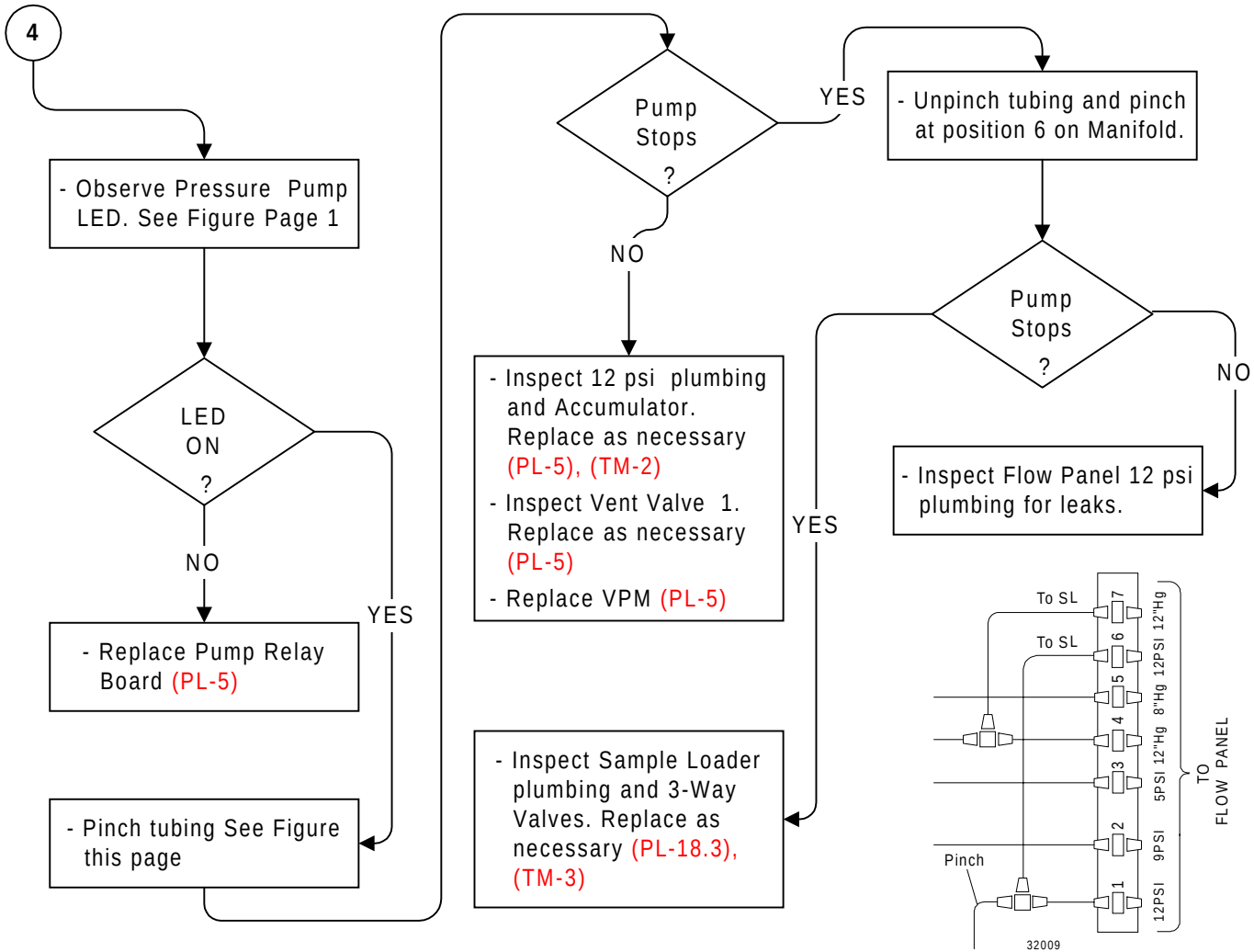
IP-17 Primary Vacuum/Pressure Isolation, (Page 3 of 9)



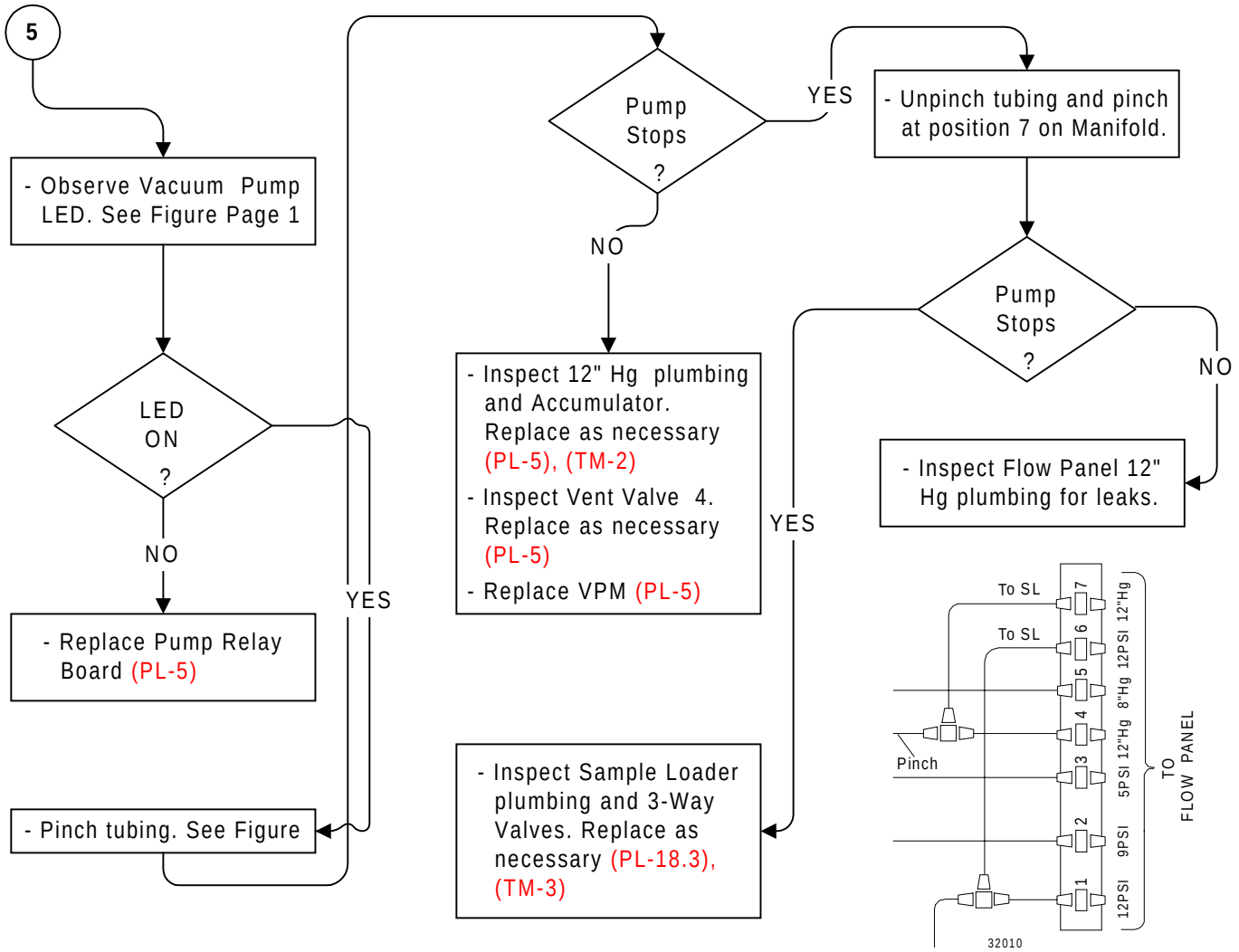
IP-17 Primary Vacuum/Pressure Isolation, (Page 4 of 9)


3
- Pinch tubing as shown in Figure
Pumps Stop ?
YES
NO
- Unpinch tubing
- Pinch tubing at positions 6 and 7 that supply 12 psi and 12" Hg to Sample Loader
Pumps Stop ?
YES
NO
- Inspect 12 psi and 12" Hg plumbing and Accumulators. Replace as necessary (PL-5), (TM-2)
- Inspect Vent Valves 1 and 4. Replace as necessary (PL-5)
- Replace VPM (PL-5)
- Inspect Sample Loader plumbing and 3-Way Valves. Replace as necessary (PL-18.3), (TM-3)
- Ensure Valves 31 and 32, 97 and 98, 17 and 18 are not open at the same time.
- Inspect Flow Panel 12 psi and 12" Hg plumbing for leaks.
To SL
To SL
Pinch
7
6
5
4
3
2
1
12PSI
9PSI
5PSI 12"Hg
8"Hg 12PSI 12"Hg
TO FLOW PANEL
32008

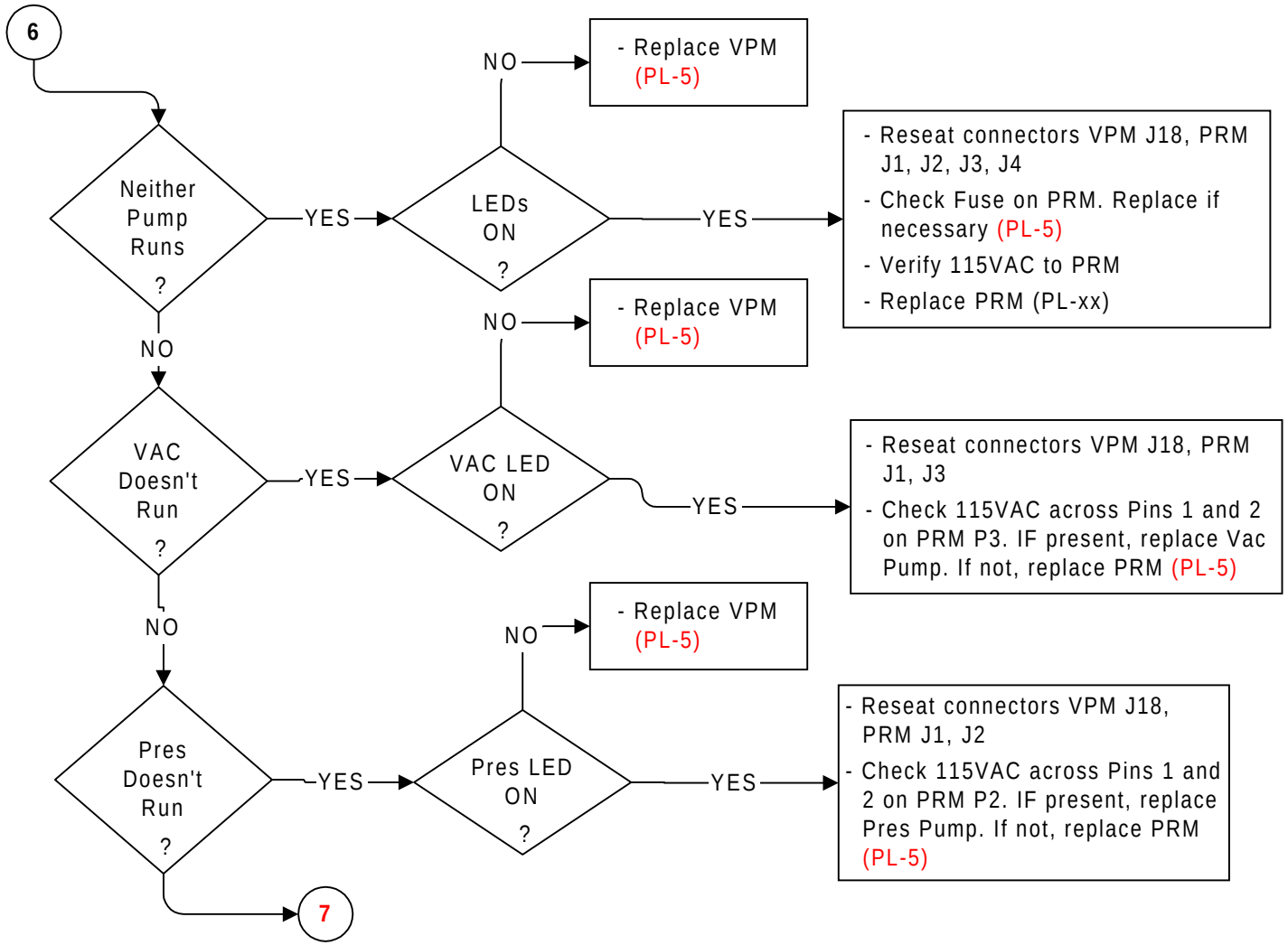
IP-17 Primary Vacuum/Pressure Isolation, (Page 5 of 9)


4
- Observe Pressure Pump LED. See Figure Page 1
LED ON ?
NO
YES
- Replace Pump Relay Board (PL-5)
- Pinch tubing See Figure this page
Pump Stops ?
NO
YES
- Inspect 12 psi plumbing and Accumulator. Replace as necessary (PL-5), (TM-2)
- Inspect Vent Valve 1. Replace as necessary (PL-5)
- Replace VPM (PL-5)
- Inspect Sample Loader plumbing and 3-Way Valves. Replace as necessary (PL-18.3), (TM-3)
- Unpinch tubing and pinch at position 6 on Manifold.
Pump Stops ?
YES
NO
- Inspect Flow Panel 12 psi plumbing for leaks.
To SL
To SL
Pinch
12PSI
9PSI
5PSI 12"Hg
8"Hg 12PSI 12"Hg
TO FLOW PANEL
32009

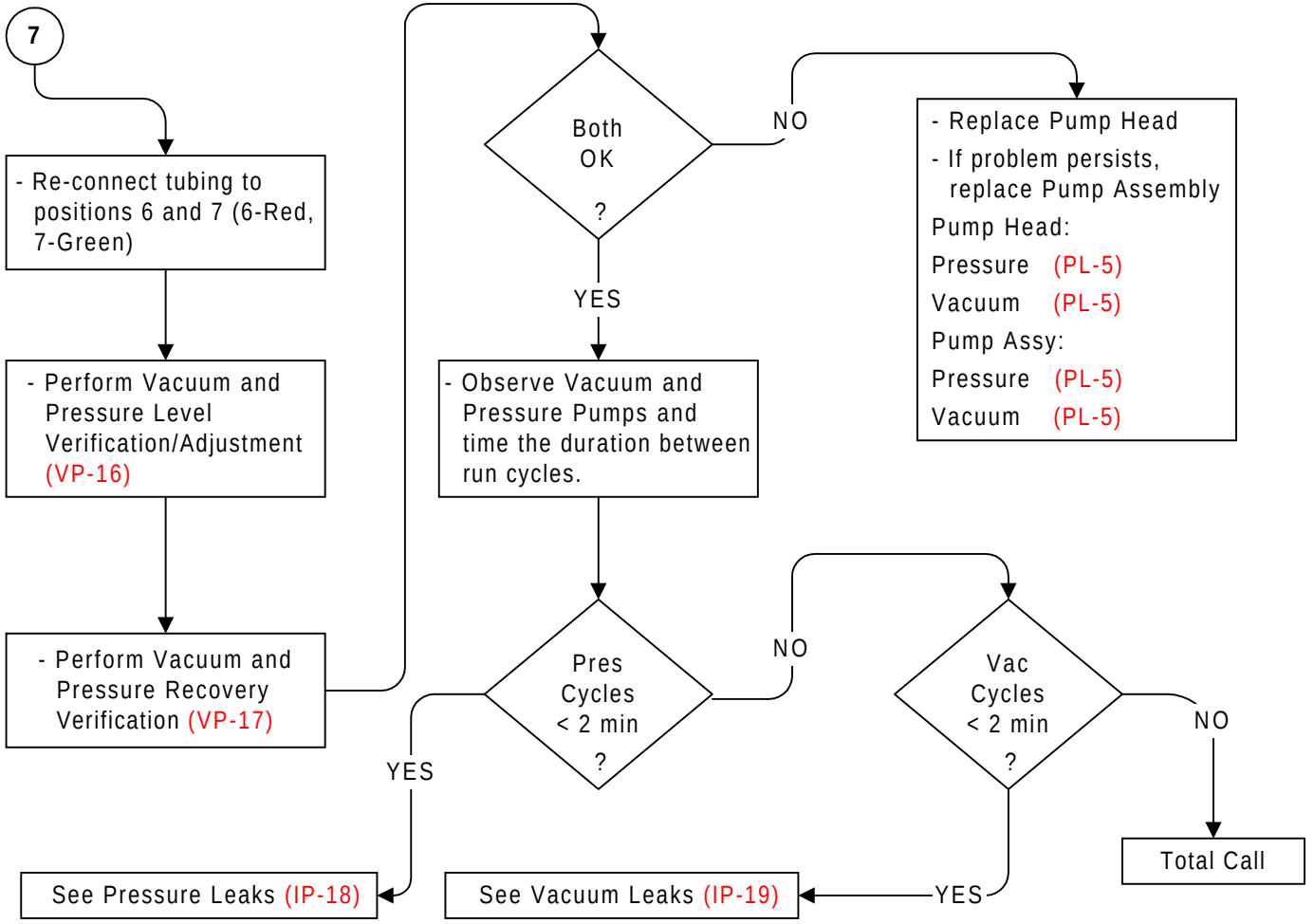
IP-17 Primary Vacuum/Pressure Isolation, (Page 6 of 9)



IP-17 Primary Vacuum/Pressure Isolation, (Page 7 of 9)


6
Neither Pump Runs ?
YES
LEDs ON ?
NO
- Replace VPM (PL-5)
YES
- Reseat connectors VPM J18, PRM J1, J2, J3, J4
- Check Fuse on PRM. Replace if necessary (PL-5)
- Verify 115VAC to PRM
- Replace PRM (PL-xx)
NO
VAC Doesn't Run ?
YES
VAC LED ON ?
NO
- Replace VPM (PL-5)
YES
- Reseat connectors VPM J18, PRM J1, J3
- Check 115VAC across Pins 1 and 2 on PRM P3. IF present, replace Vac Pump. If not, replace PRM (PL-5)
NO
Pres Doesn't Run ?
YES
Pres LED ON ?
NO
- Replace VPM (PL-5)
YES
- Reseat connectors VPM J18, PRM J1, J2
- Check 115VAC across Pins 1 and 2 on PRM P2. IF present, replace Pres Pump. If not, replace PRM (PL-5)
7

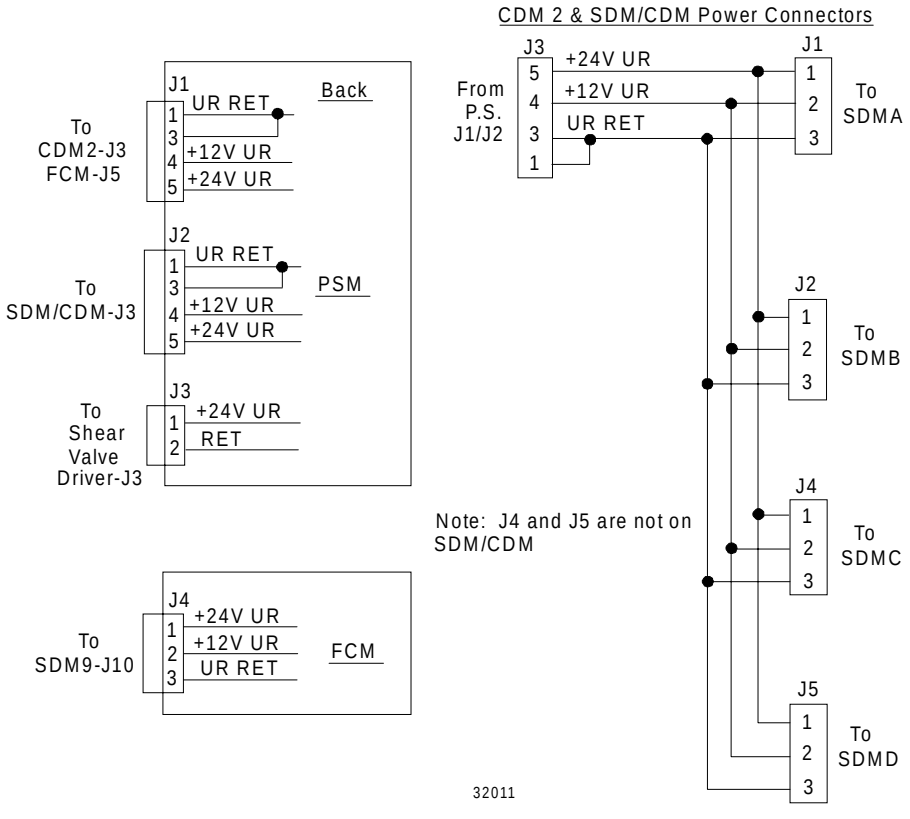
IP-17 Primary Vacuum/Pressure Isolation, (Page 8 of 9)



IP-17 Primary Vacuum/Pressure Isolation, (Page 9 of 9)

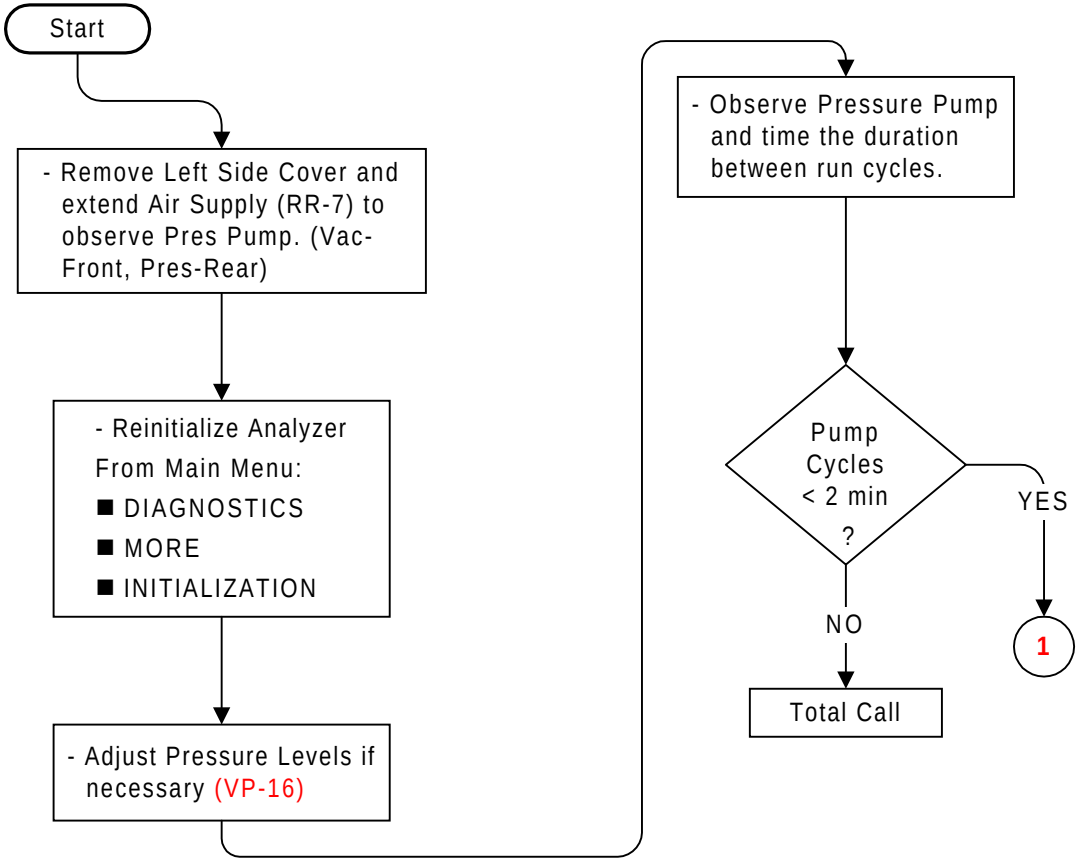
8

- If the Fuse continues to blow, assemblies on the +12V UR or +24V UR must be disconnected one at a time until the shorted assembly is found and replaced. (See Figures)
- Power-down instrument and connect Meter between TP2-+12V or TP1-+24V and TP4 on PSM and remove connectors until short is found
- Replace defective assembly and verify proper operation

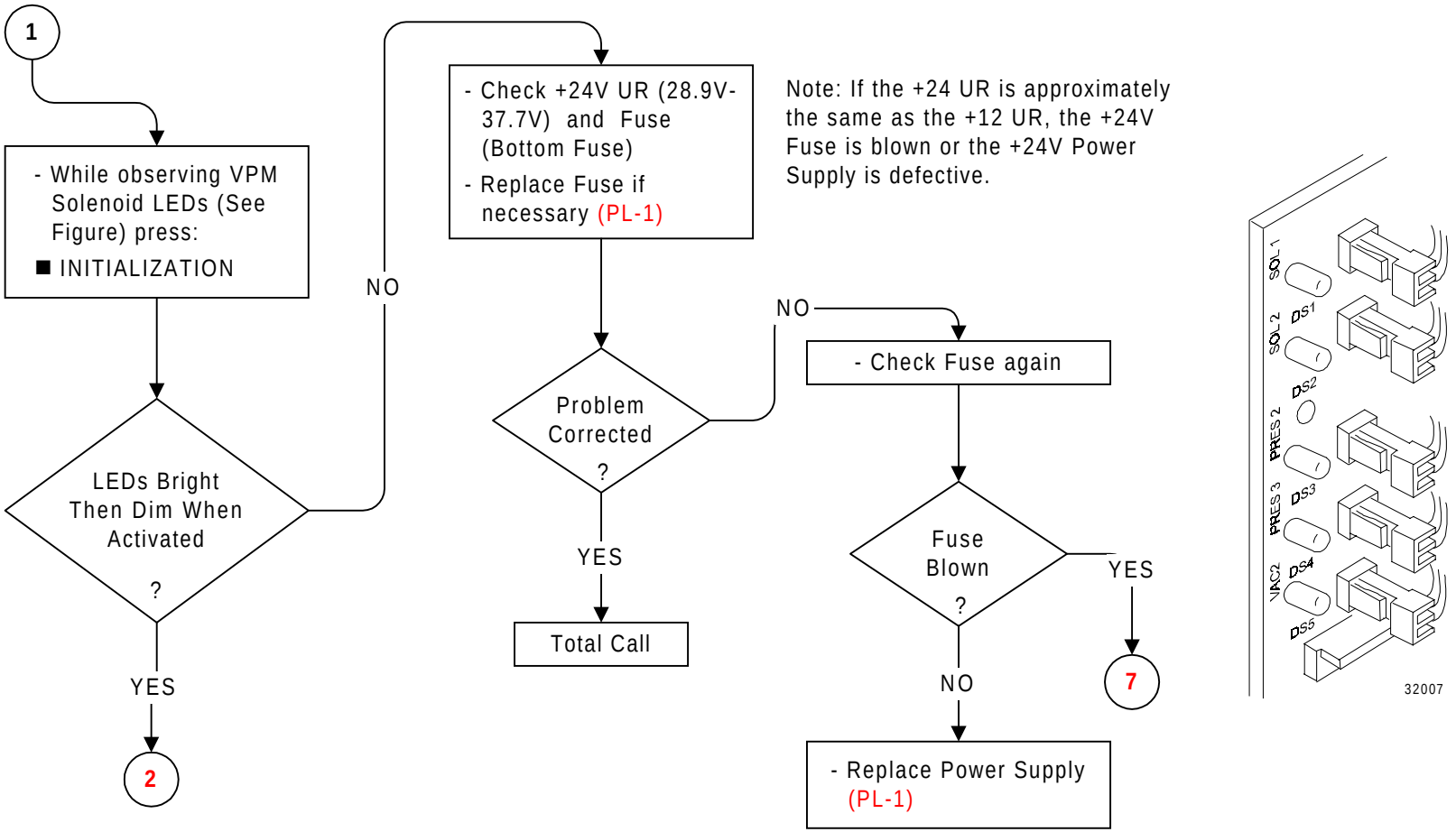


IP-18 Pressure Leak Isolation (Page 1 of 7)

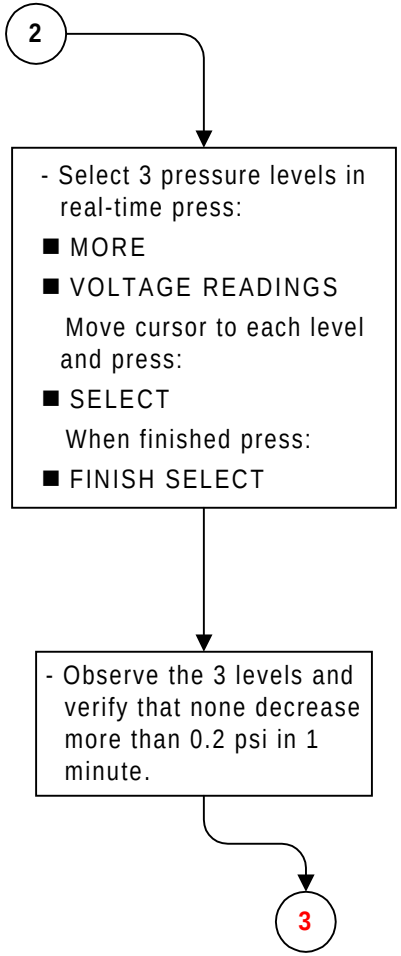
Note: This procedure is designed to isolate leaks in the pressure plumbing. Refer to IP-17 Primary Vacuum/ Pressure Isolation for troubleshooting gross pressure failures.


Start
- Remove Left Side Cover and extend Air Supply (RR-7) to observe Pres Pump. (Vac-Front, Pres-Rear)
- Reinitialize Analyzer
From Main Menu:
■ DIAGNOSTICS
■ MORE
■ INITIALIZATION
- Adjust Pressure Levels if necessary (VP-16)
- Observe Pressure Pump and time the duration between run cycles.
Pump Cycles < 2 min ?
YES
NO
1
Total Call

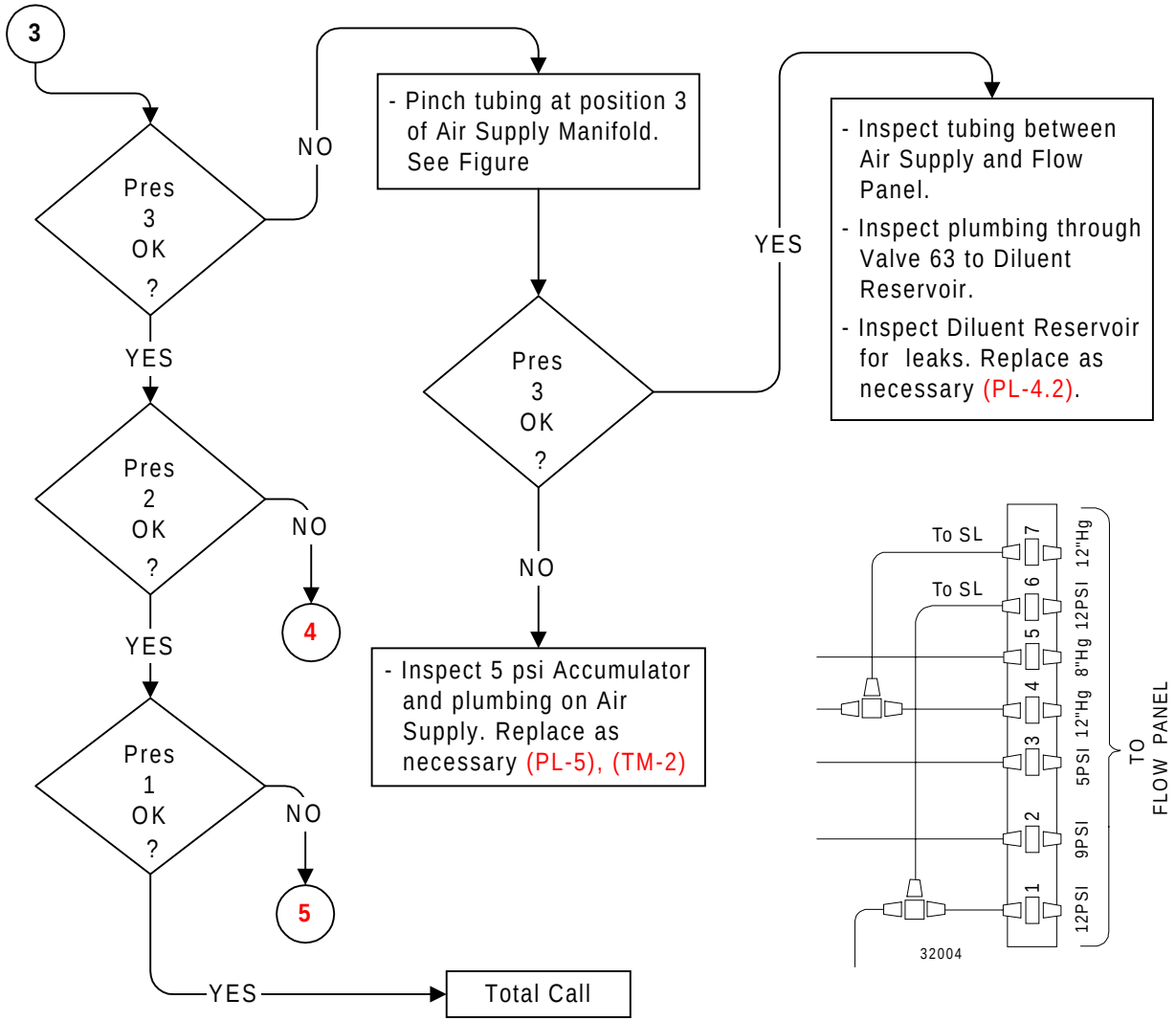
IP-18 Pressure Leak Isolation (Page 2 of 7)



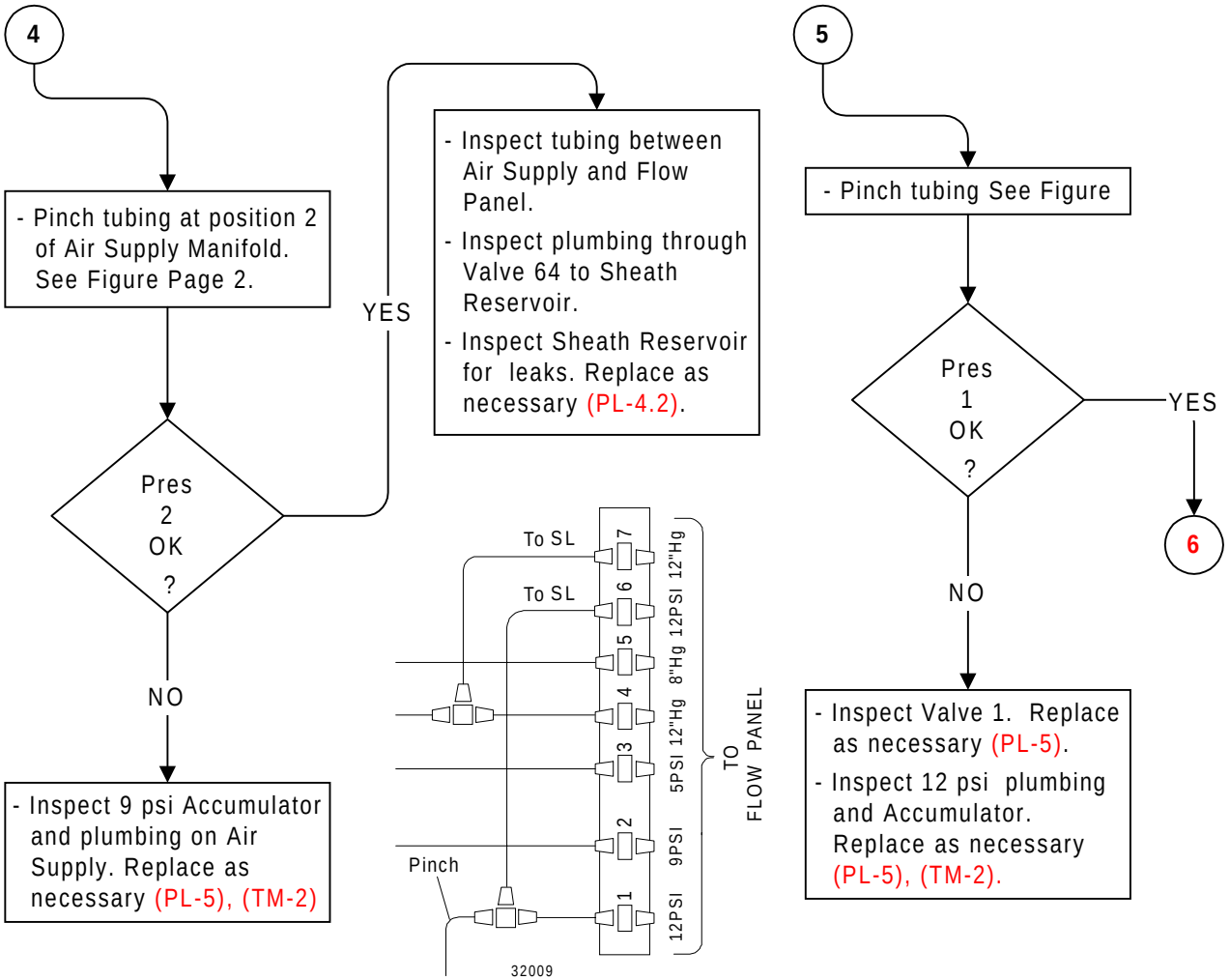
IP-18 Pressure Leak Isolation (Page 3 of 7)


2
- Select 3 pressure levels in real-time press:
■ MORE
■ VOLTAGE READINGS
Move cursor to each level and press:
■ SELECT
When finished press:
■ FINISH SELECT
- Observe the 3 levels and verify that none decrease more than 0.2 psi in 1 minute.
3

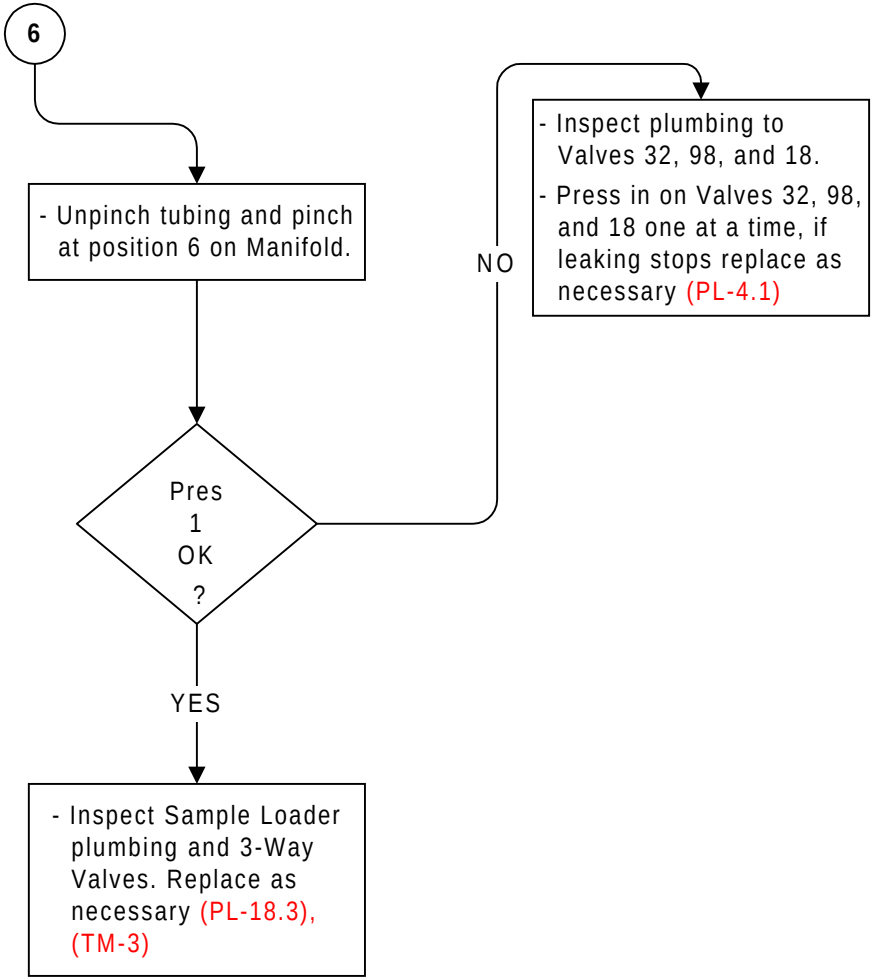
IP-18 Pressure Leak Isolation (Page 4 of 7)



IP-18 Pressure Leak Isolation (Page 5 of 7)



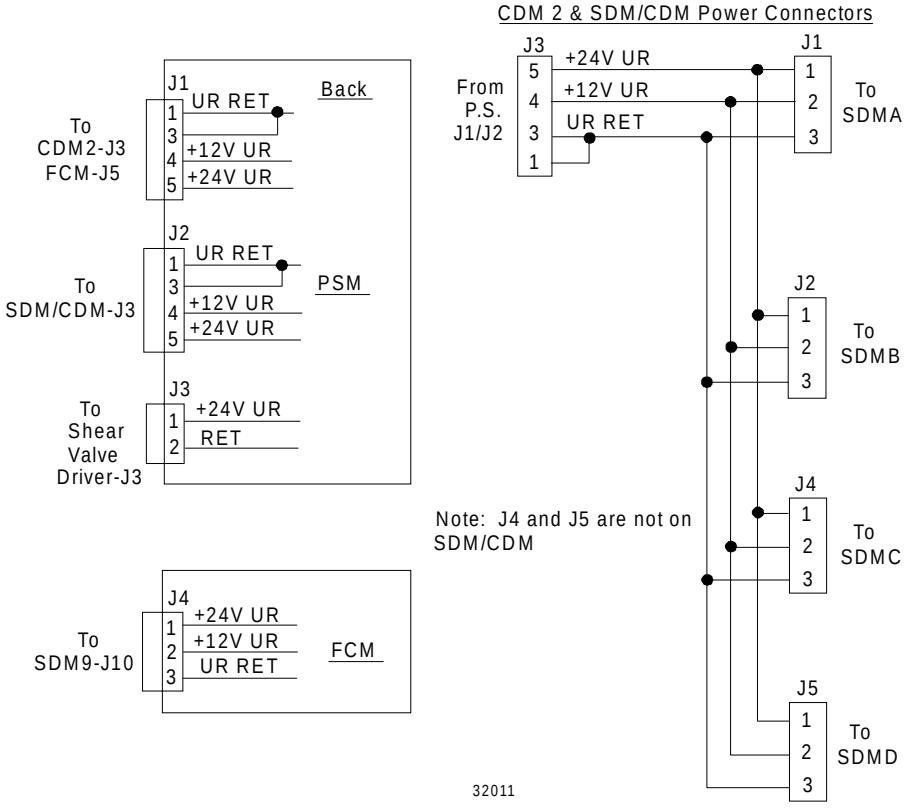
IP-18 Pressure Leak Isolation (Page 6 of 7)


6
- Unpinch tubing and pinch at position 6 on Manifold.
Pres 1 OK ?
NO
- Inspect plumbing to Valves 32, 98, and 18.
- Press in on Valves 32, 98, and 18 one at a time, if leaking stops replace as necessary (PL-4.1)
YES
- Inspect Sample Loader plumbing and 3-Way Valves. Replace as necessary (PL-18.3), (TM-3)

IP-18 Pressure Leak Isolation (Page 7 of 7)

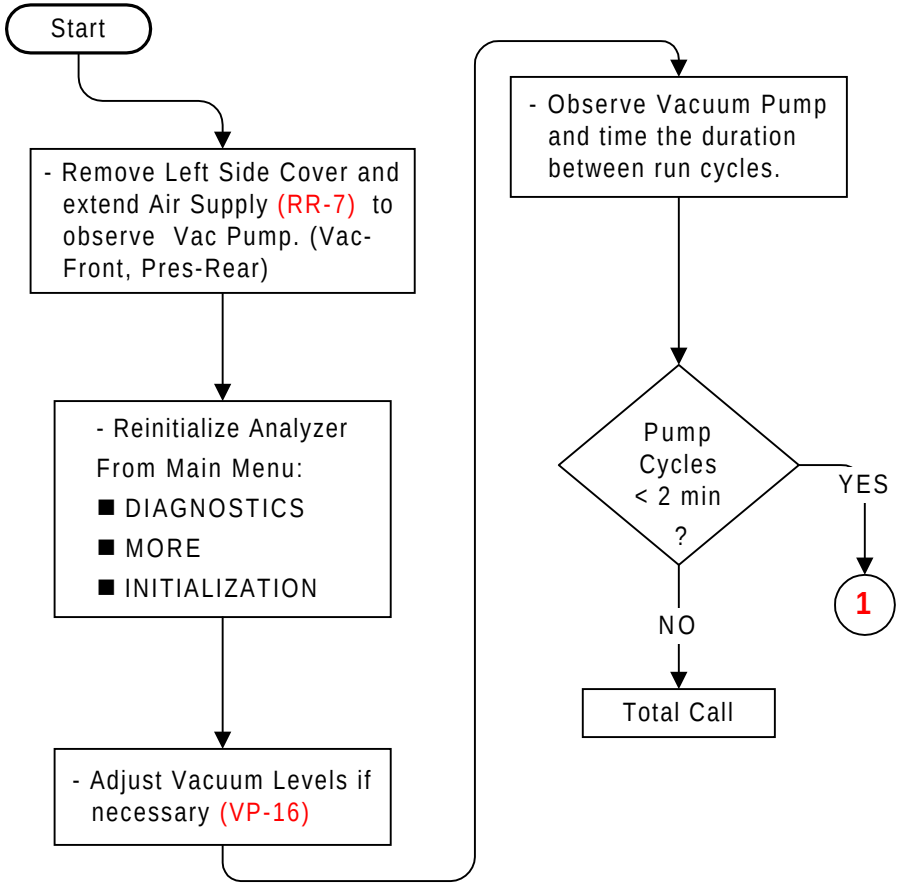
7

- If the Fuse continues to blow, assemblies on the +12V UR or +24V UR must be disconnected one at a time until the shorted assembly is found and replaced. (See Figures)
- Power-down instrument and connect Meter between TP2-+12V or TP1-+24V and TP4 on PSM and remove connectors until short is found
- Replace defective assembly and verify proper operation

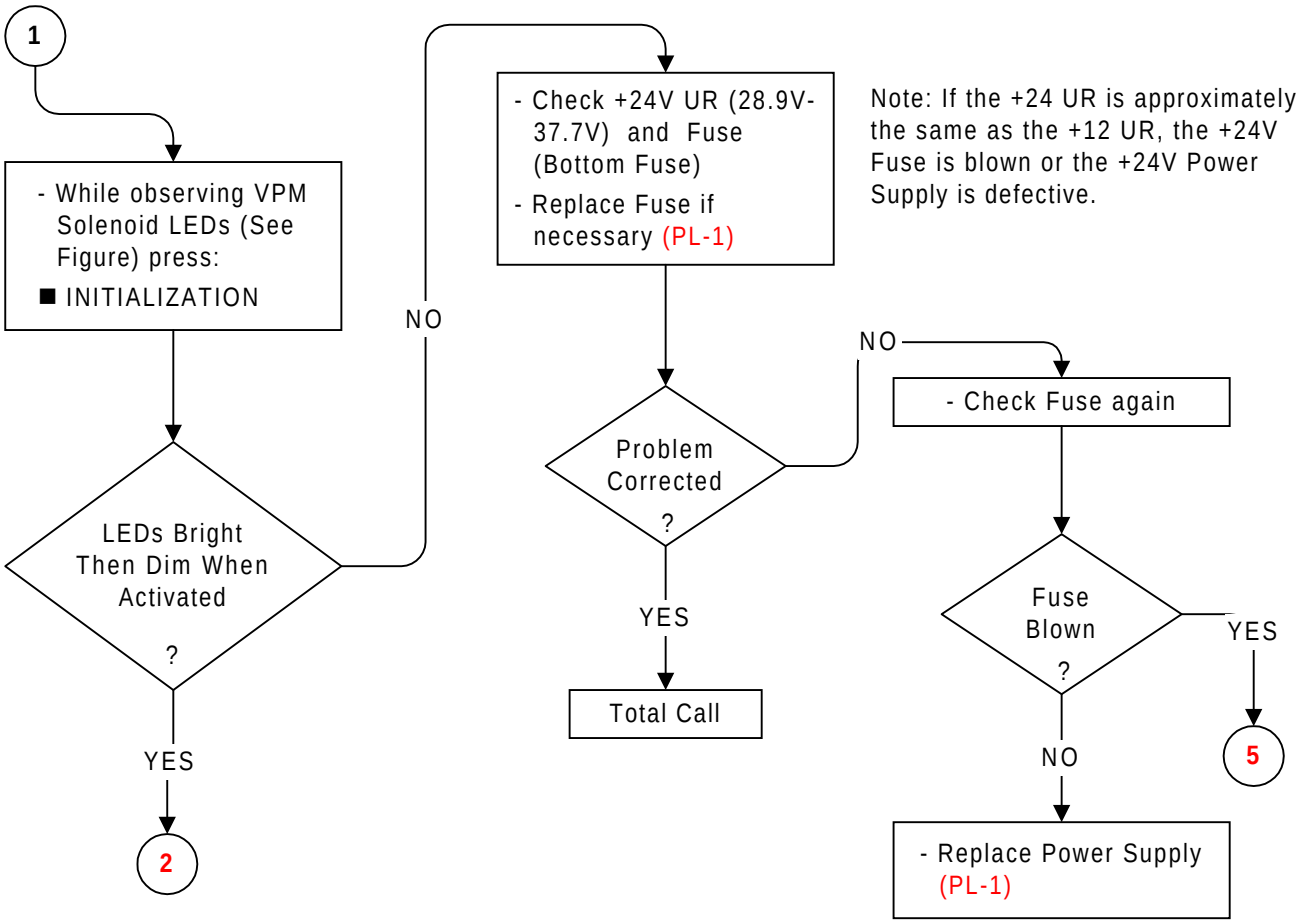


IP-19 Vacuum Leak Isolation (Page 1 of 6)

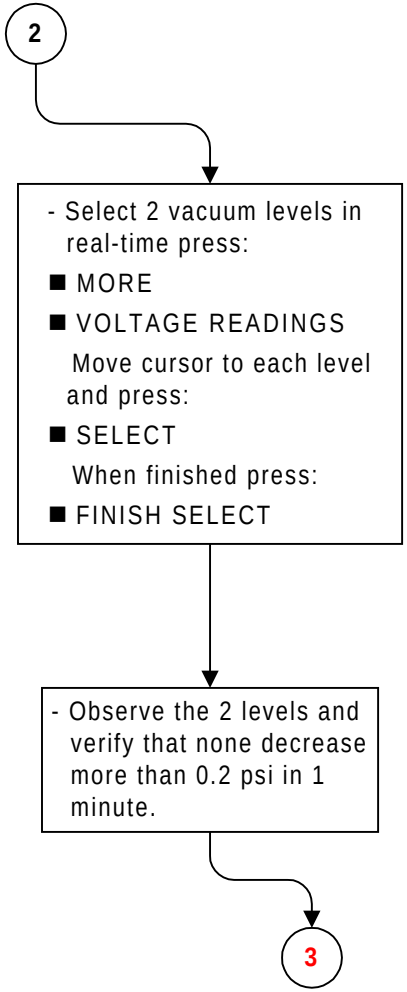
Note: This procedure is designed to isolate leaks in the vacuum plumbing. Refer to IP-17 Primary Vacuum/ Pressure Isolation for troubleshooting gross vacuum failures.


Start
- Remove Left Side Cover and extend Air Supply (RR-7) to observe Vac Pump. (Vac-Front, Pres-Rear)
- Reinitialize Analyzer From Main Menu:
■ DIAGNOSTICS
■ MORE
■ INITIALIZATION
- Adjust Vacuum Levels if necessary (VP-16)
- Observe Vacuum Pump and time the duration between run cycles.
Pump Cycles < 2 min ?
YES
1
NO
Total Call

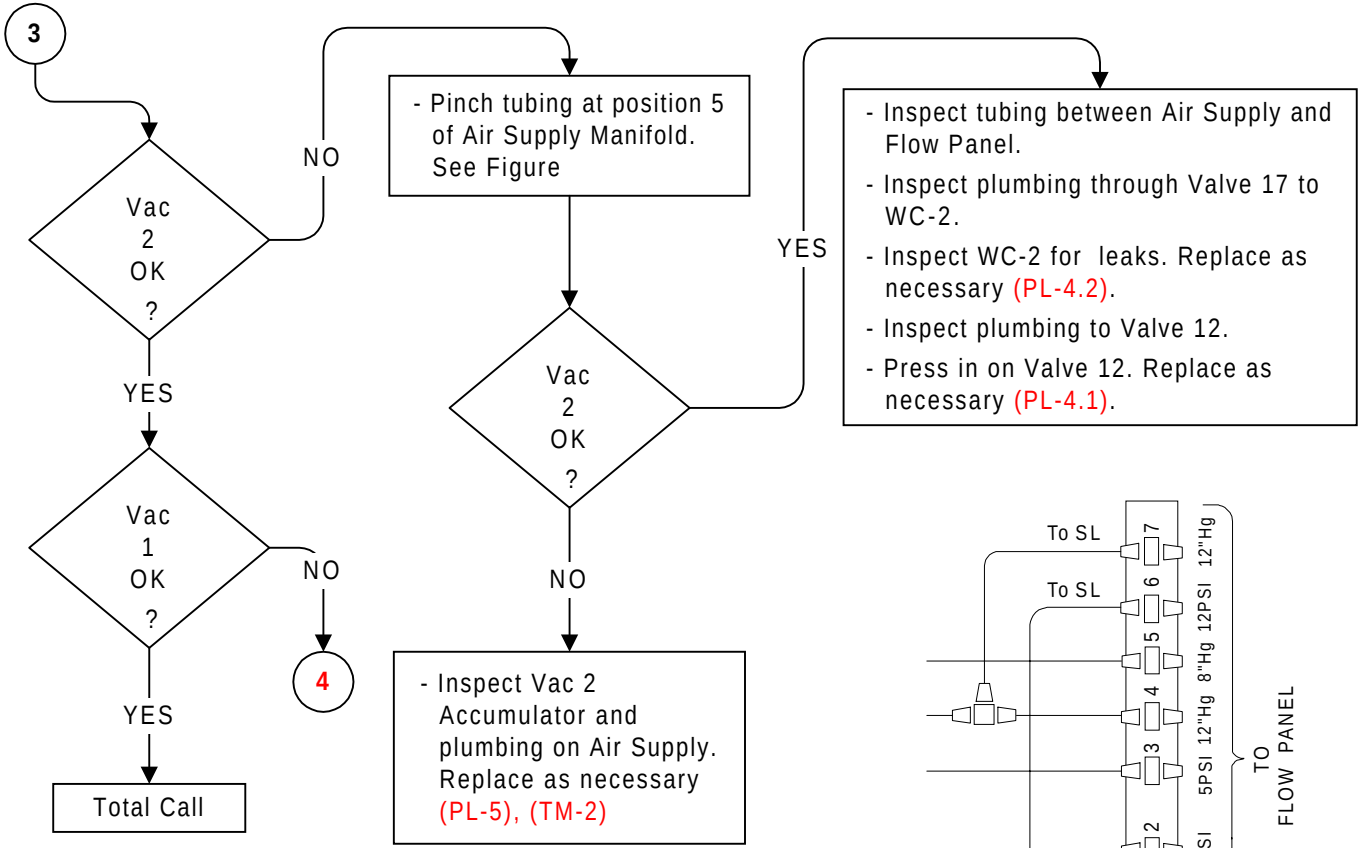
IP-19 Vacuum Leak Isolation (Page 2 of 6)



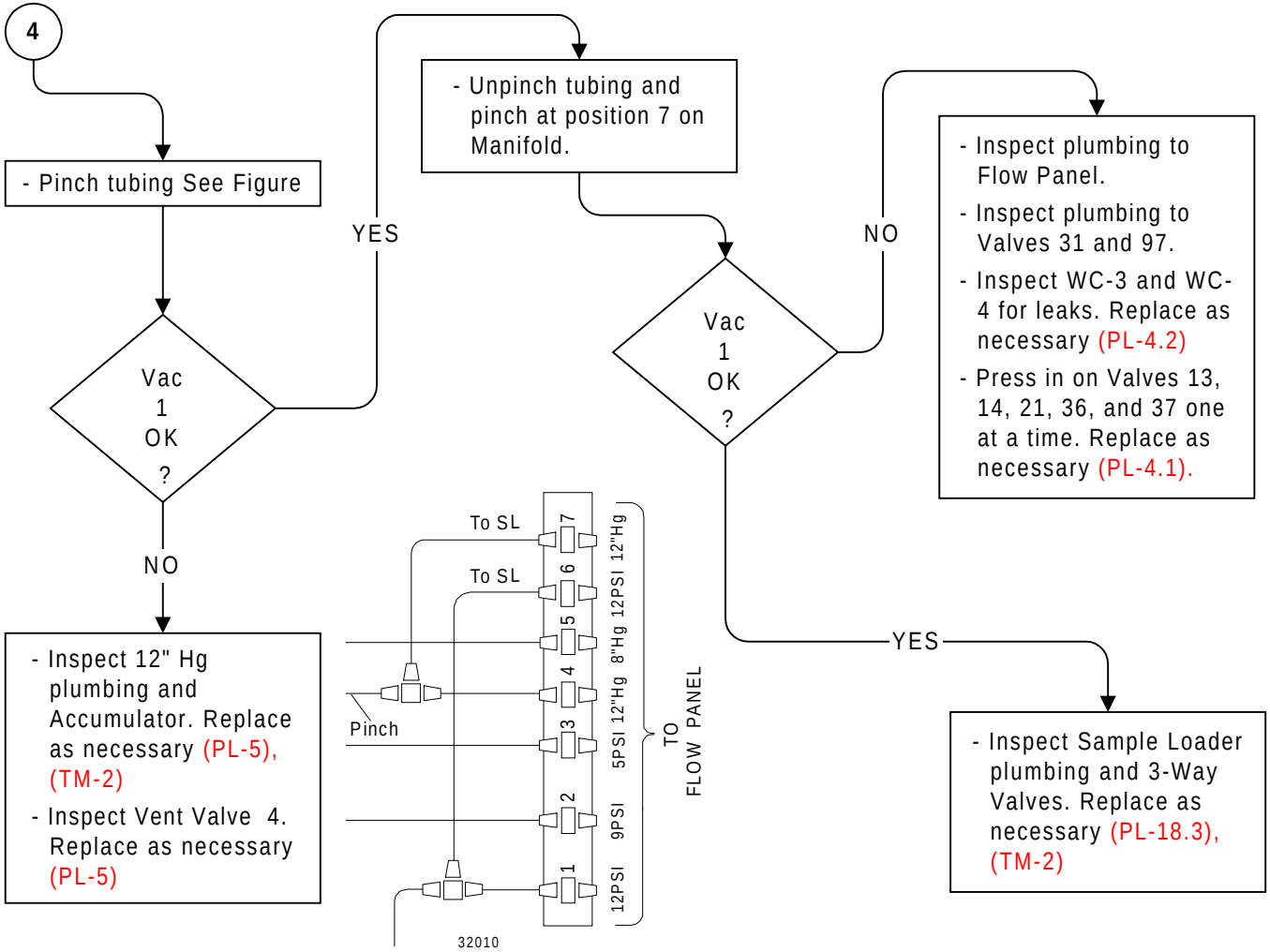
IP-19 Vacuum Leak Isolation (Page 3 of 6)


2
- Select 2 vacuum levels in real-time press:
■ MORE
■ VOLTAGE READINGS
Move cursor to each level and press:
■ SELECT
When finished press:
■ FINISH SELECT
- Observe the 2 levels and verify that none decrease more than 0.2 psi in 1 minute.
3

IP-19 Vacuum Leak Isolation (Page 4 of 6)



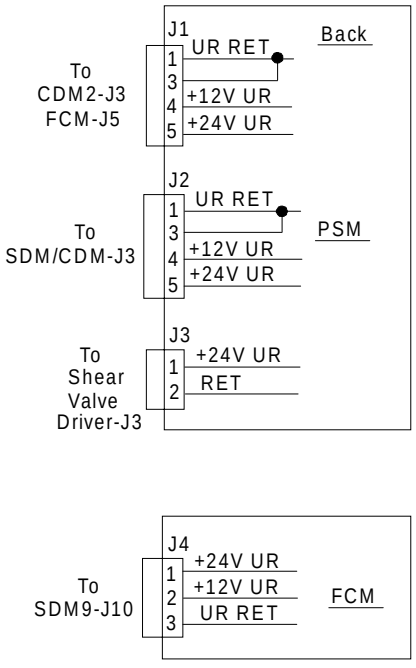
IP-19 Vacuum Leak Isolation (Page 5 of 6)

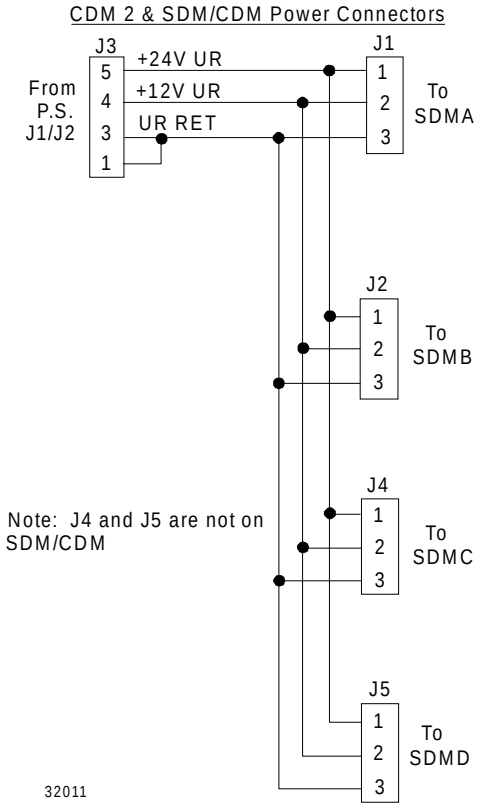

4
- Pinch tubing See Figure
Vac 1 OK ?
YES
NO
- Unpinch tubing and pinch at position 7 on Manifold.
Vac 1 OK ?
NO
YES
- Inspect plumbing to Flow Panel.
- Inspect plumbing to Valves 31 and 97.
- Inspect WC-3 and WC-4 for leaks. Replace as necessary (PL-4.2)
- Press in on Valves 13, 14, 21, 36, and 37 one at a time. Replace as necessary (PL-4.1).
- Inspect 12" Hg plumbing and Accumulator. Replace as necessary (PL-5), (TM-2)
- Inspect Vent Valve 4. Replace as necessary (PL-5)
- Inspect Sample Loader plumbing and 3-Way Valves. Replace as necessary (PL-18.3), (TM-2)
To SL
To SL
Pinch
7
6
5
4
3
2
1
12PSI
9PSI
5PSI 12"Hg
8"Hg 12PSI 12"Hg
TO FLOW PANEL
32010

IP-19 Vacuum Leak Isolation (Page 6 of 6)

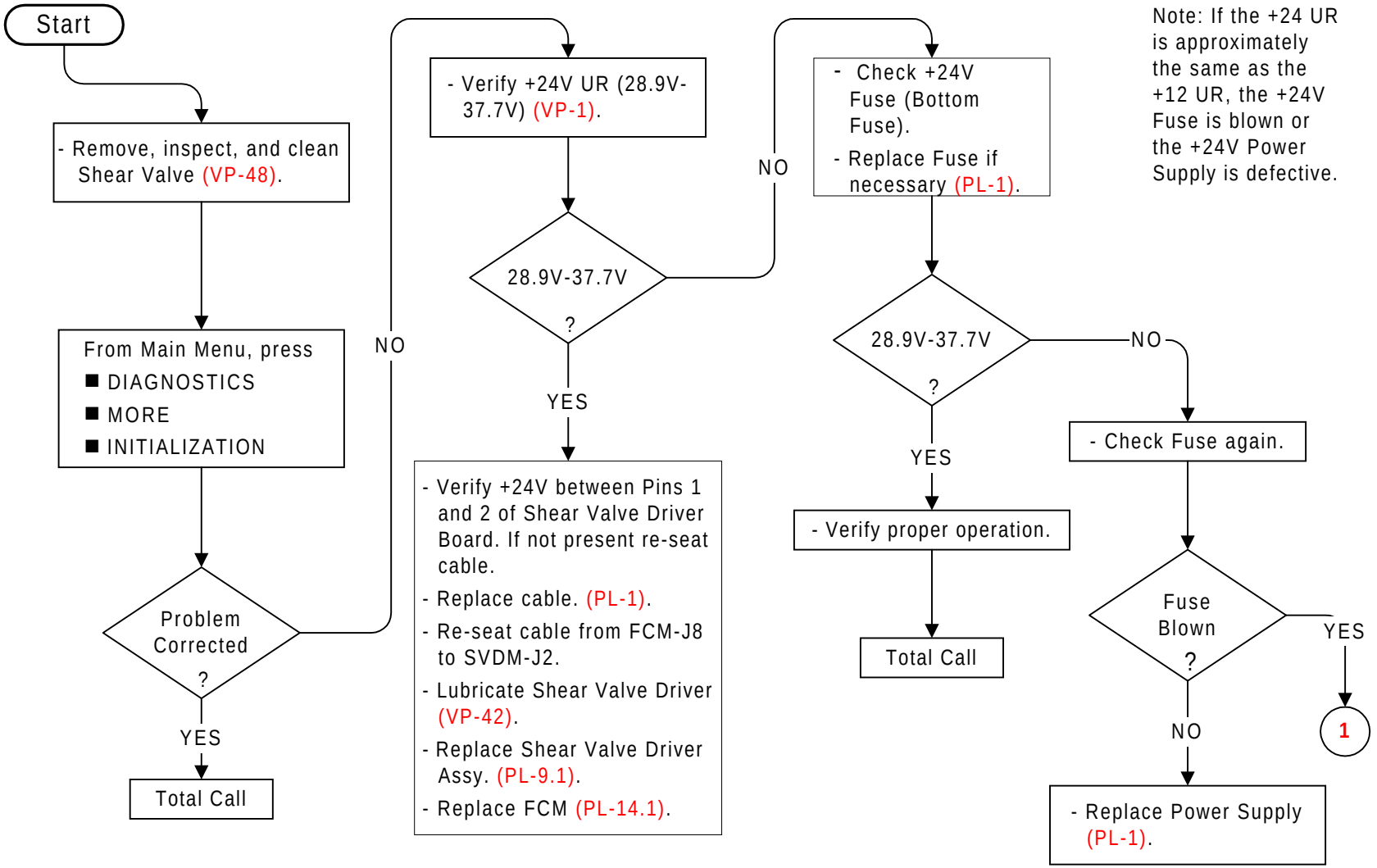
5

- If the Fuse continues to blow, assemblies on the +12V UR or +24V UR must be disconnected one at a time until the shorted assembly is found and replaced. (See Figures)
- Power-down instrument and connect Meter between TP2-+12V or TP1-+24V and TP4 on PSM and remove connectors until short is found
- Replace defective assembly and verify proper operation





IP-20 Shear Valve Position Fault (Page 1 of 2)

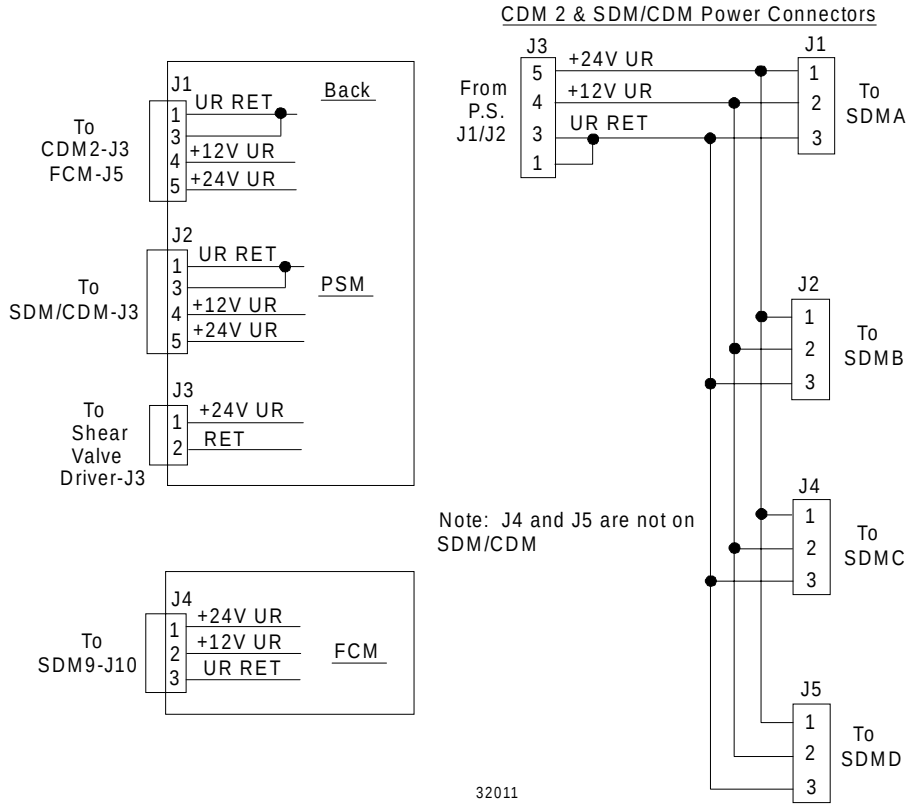

Start
- Remove, inspect, and clean Shear Valve (VP-48).
From Main Menu, press
■ DIAGNOSTICS
■ MORE
■ INITIALIZATION
Problem Corrected ?
YES
Total Call
NO
- Verify +24V UR (28.9V-37.7V) (VP-1).
28.9V-37.7V ?
YES
- Verify +24V between Pins 1 and 2 of Shear Valve Driver Board. If not present re-seat cable.
- Replace cable. (PL-1).
- Re-seat cable from FCM-J8 to SVDM-J2.
- Lubricate Shear Valve Driver (VP-42).
- Replace Shear Valve Driver Assy. (PL-9.1).
- Replace FCM (PL-14.1).
NO
- Check +24V Fuse (Bottom Fuse).
- Replace Fuse if necessary (PL-1).
28.9V-37.7V ?
YES
- Verify proper operation.
Total Call
NO
- Check Fuse again.
Fuse Blown ?
YES
1
NO
- Replace Power Supply (PL-1).
Note: If the +24 UR is approximately the same as the +12 UR, the +24V Fuse is blown or the +24V Power Supply is defective.

IP-20 Shear Valve Position Fault (Page 2 of 2)

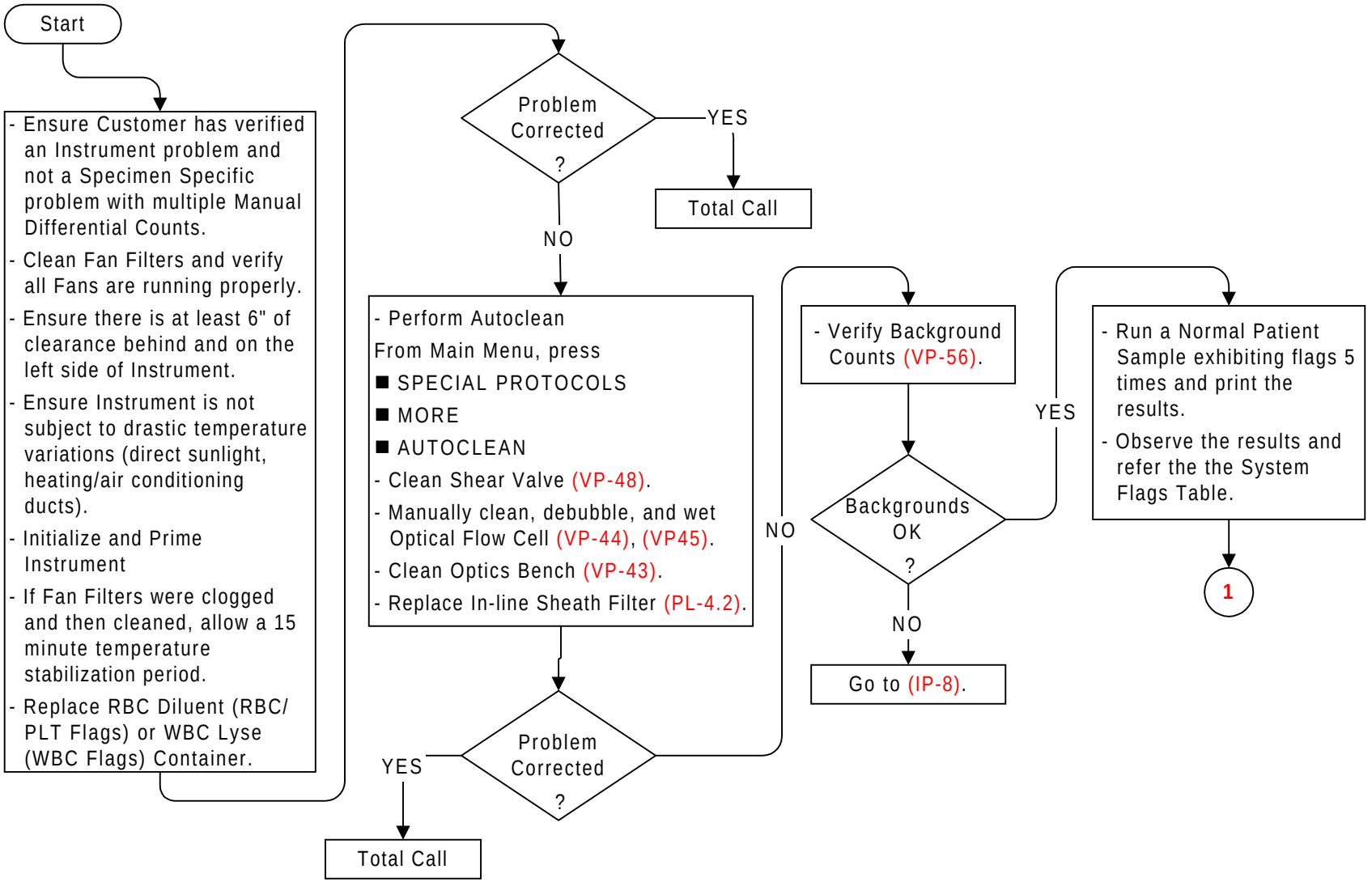
IP-20 Shear Valve Position Fault, 2 of 2

1

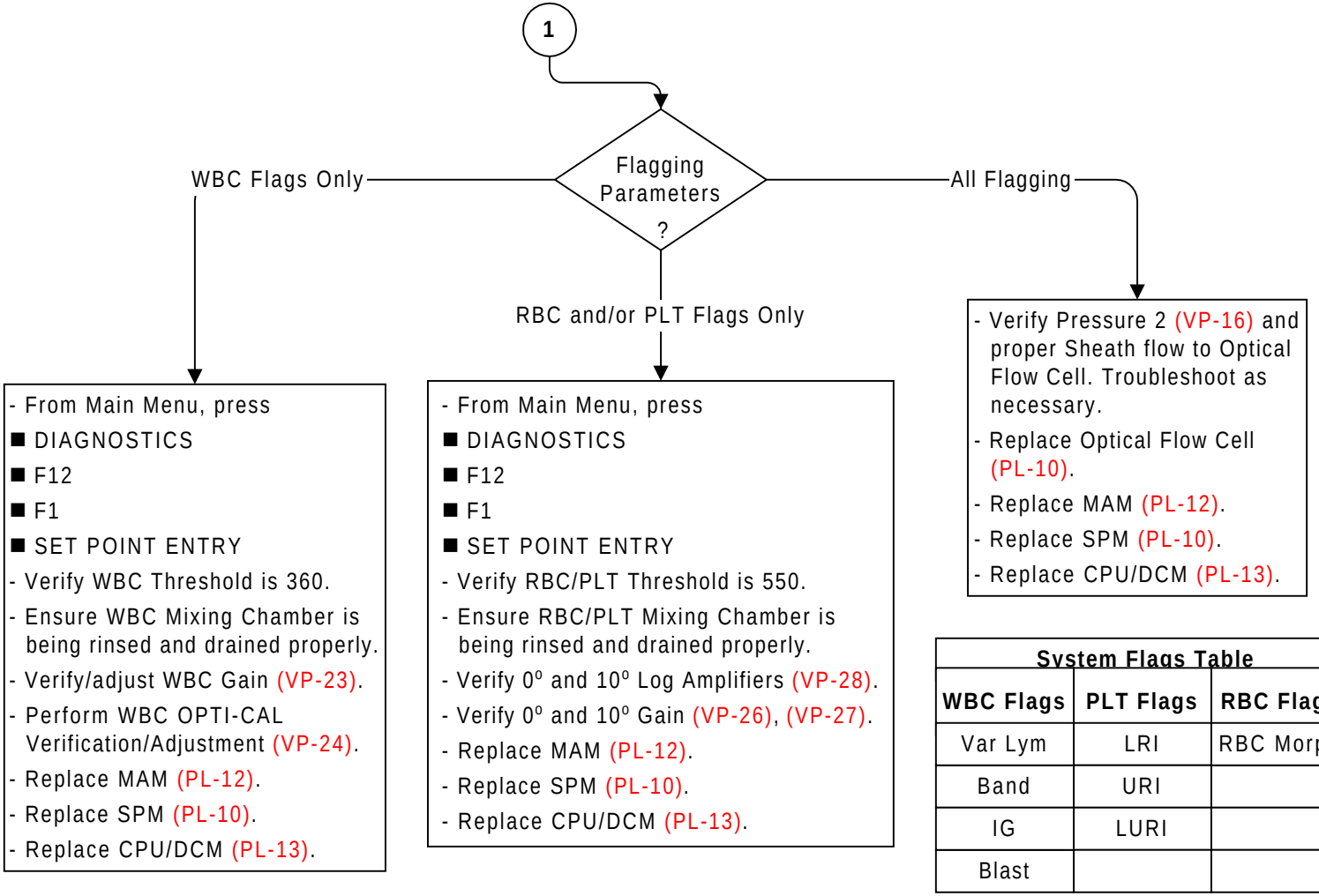
- If the Fuse continues to blow, assemblies on the +12V UR or +24V UR must be disconnected one at a time until the shorted assembly is found and replaced. (See Figures)
- Power-down instrument and connect Meter between TP2-+12V or TP1-+24V and TP4 on PSM and remove connectors until short is found.
- Replace defective assembly and verify proper operation.



IP-21 Flags (Page 1 of 2)


Start
- Ensure Customer has verified an Instrument problem and not a Specimen Specific problem with multiple Manual Differential Counts.
- Clean Fan Filters and verify all Fans are running properly.
- Ensure there is at least 6" of clearance behind and on the left side of Instrument.
- Ensure Instrument is not subject to drastic temperature variations (direct sunlight, heating/air conditioning ducts).
- Initialize and Prime Instrument
- If Fan Filters were clogged and then cleaned, allow a 15 minute temperature stabilization period.
- Replace RBC Diluent (RBC/PLT Flags) or WBC Lyse (WBC Flags) Container.
Problem Corrected ?
YES
Total Call
NO
- Perform Autoclean
From Main Menu, press
■ SPECIAL PROTOCOLS
■ MORE
■ AUTOCLEAN
- Clean Shear Valve (VP-48).
- Manually clean, debubble, and wet Optical Flow Cell (VP-44), (VP45).
- Clean Optics Bench (VP-43).
- Replace In-line Sheath Filter (PL-4.2).
Problem Corrected ?
YES
Total Call
NO
- Verify Background Counts (VP-56).
Backgrounds OK ?
NO
Go to (IP-8).
YES
- Run a Normal Patient Sample exhibiting flags 5 times and print the results.
- Observe the results and refer the the System Flags Table.
1

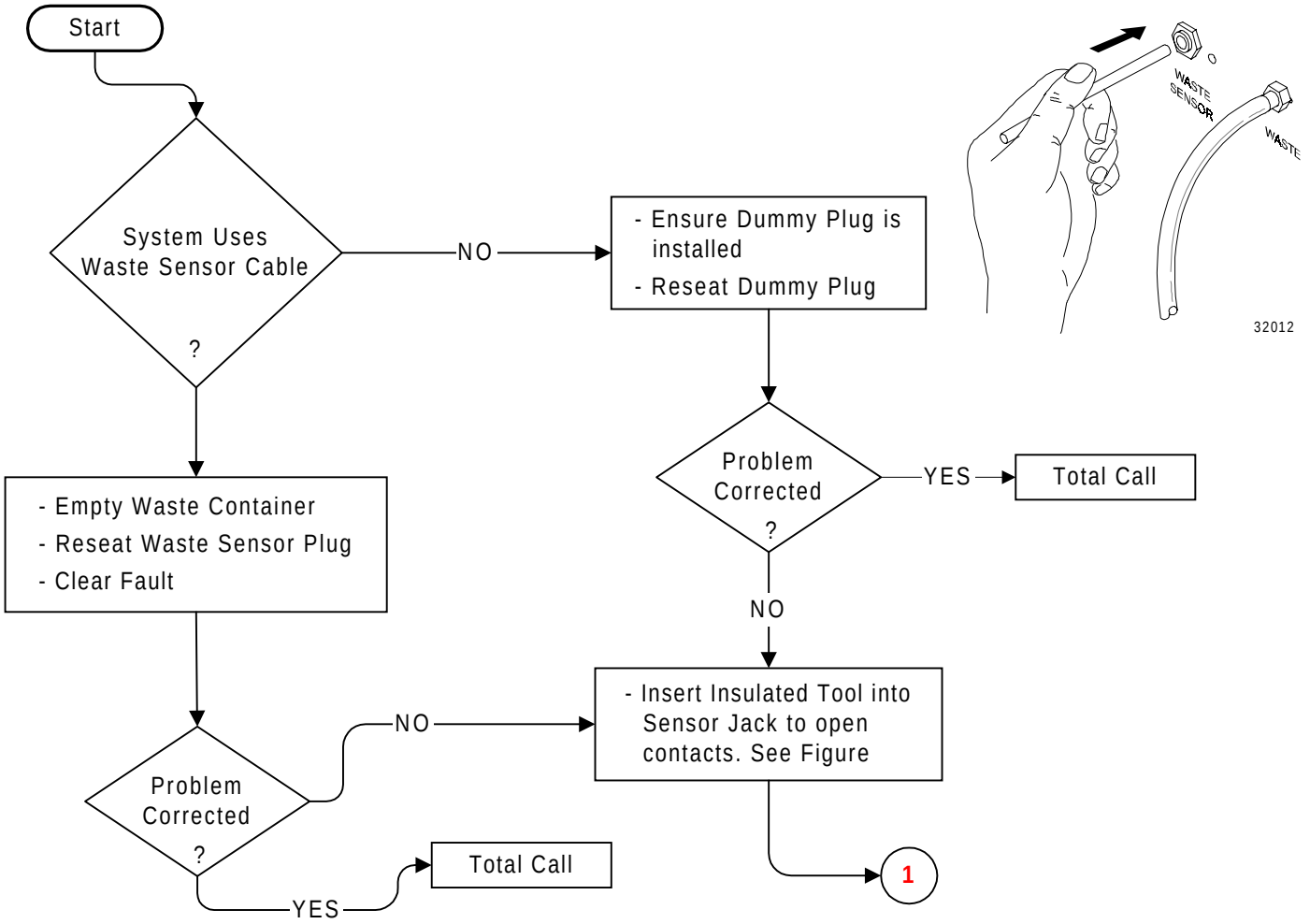
IP-21 Flags (Page 2 of 2)


1
Flagging Parameters ?
WBC Flags Only
RBC and/or PLT Flags Only
All Flagging
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify WBC Threshold is 360.
- Ensure WBC Mixing Chamber is being rinsed and drained properly.
- Verify/adjust WBC Gain (VP-23).
- Perform WBC OPTI-CAL Verification/Adjustment (VP-24).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
- From Main Menu, press
■ DIAGNOSTICS
■ F12
■ F1
■ SET POINT ENTRY
- Verify RBC/PLT Threshold is 550.
- Ensure RBC/PLT Mixing Chamber is being rinsed and drained properly.
- Verify 0° and 10° Log Amplifiers (VP-28).
- Verify 0° and 10° Gain (VP-26), (VP-27).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).
- Verify Pressure 2 (VP-16) and proper Sheath flow to Optical Flow Cell. Troubleshoot as necessary.
- Replace Optical Flow Cell (PL-10).
- Replace MAM (PL-12).
- Replace SPM (PL-10).
- Replace CPU/DCM (PL-13).

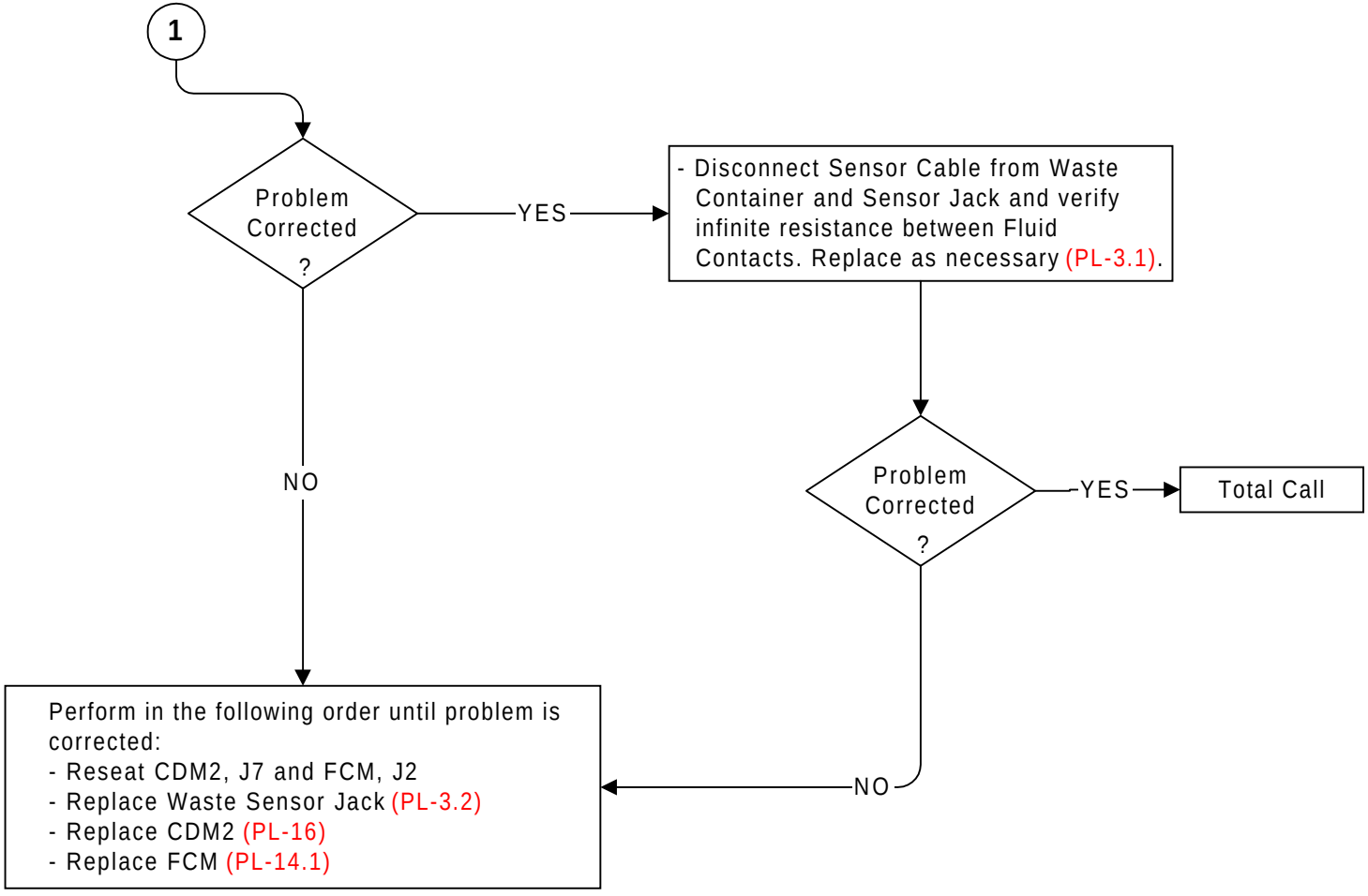
System Flags Table

WBC Flags	PLT Flags	RBC Flags
Var Lym	LRI	RBC Morph
Band	URI	
IG	LURI	
Blast		

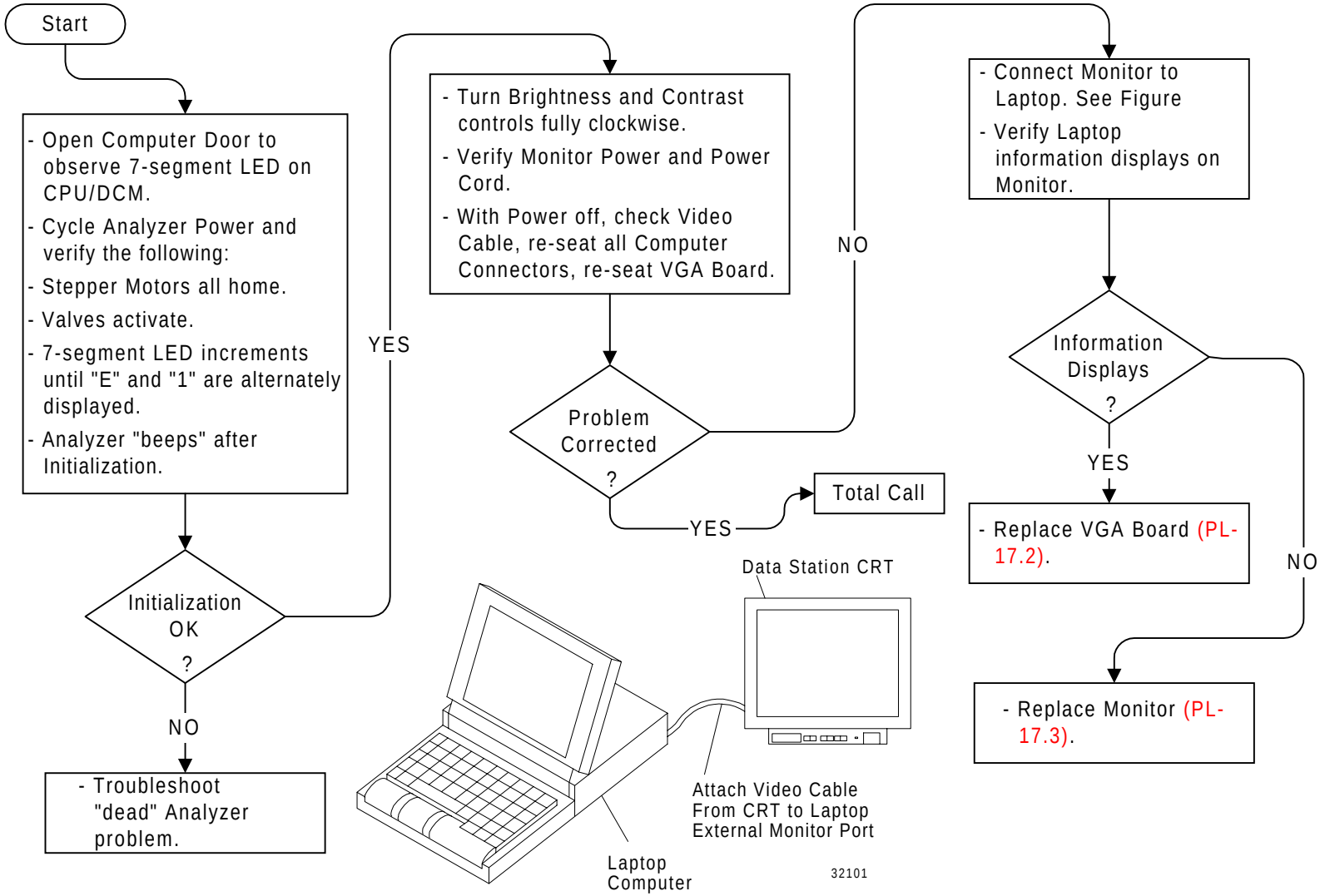
IP-22 External Waste Full (Page 1 of 2)



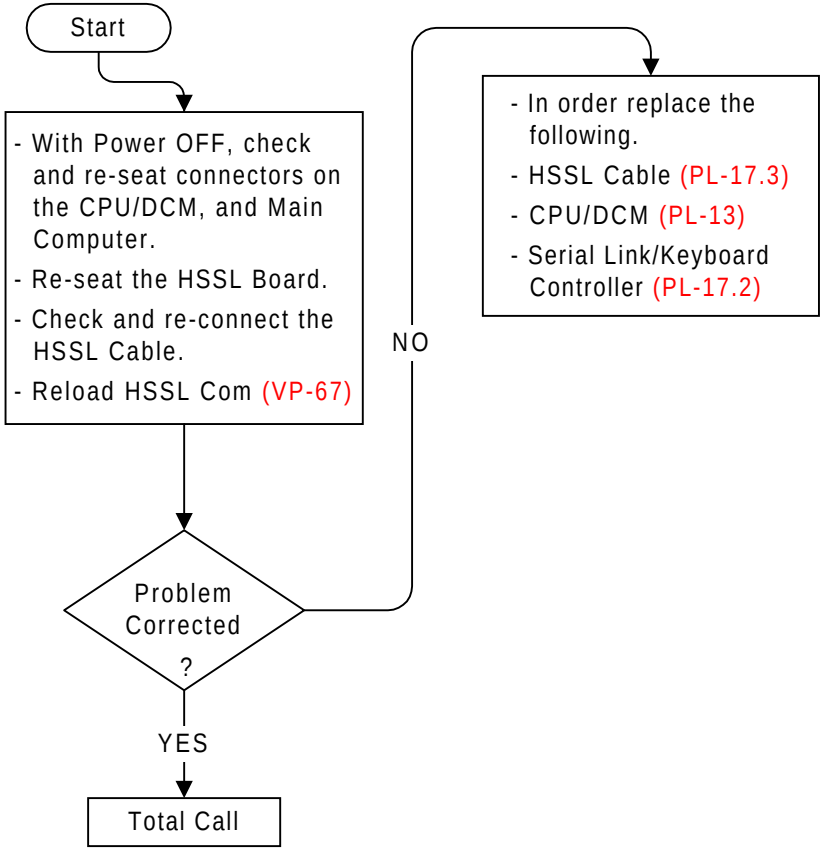
IP-22 External Waste Full (Page 2 of 2)


1
Problem Corrected ?
YES
- Disconnect Sensor Cable from Waste Container and Sensor Jack and verify infinite resistance between Fluid Contacts. Replace as necessary (PL-3.1).
NO
Problem Corrected ?
YES
Total Call
NO
Perform in the following order until problem is corrected:
- Reseat CDM2, J7 and FCM, J2
- Replace Waste Sensor Jack (PL-3.2)
- Replace CDM2 (PL-16)
- Replace FCM (PL-14.1)

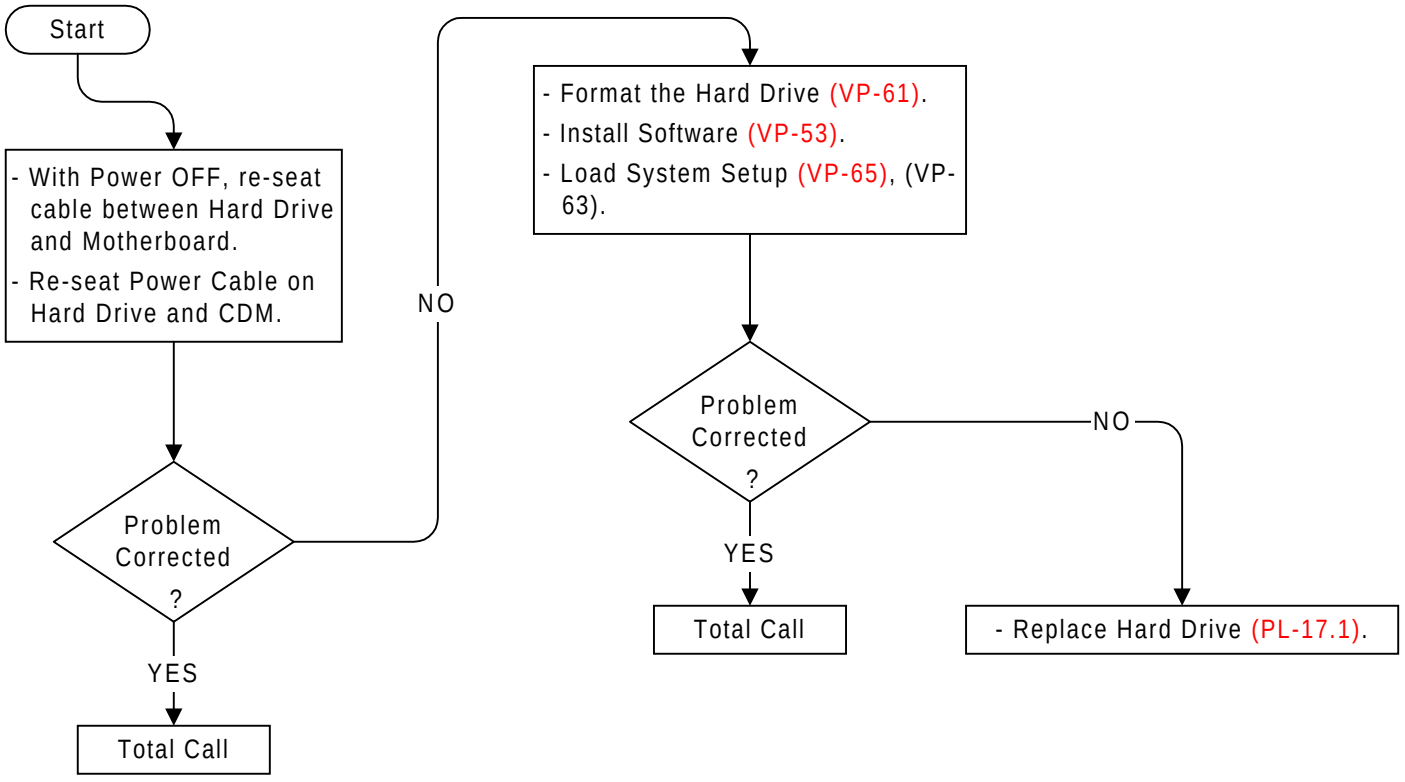
IP-23 Blank Display (Page 1 of 1)


Start
- Open Computer Door to observe 7-segment LED on CPU/DCM.
- Cycle Analyzer Power and verify the following:
- Stepper Motors all home.
- Valves activate.
- 7-segment LED increments until "E" and "1" are alternately displayed.
- Analyzer "beeps" after Initialization.
Initialization OK ?
YES
NO
- Troubleshoot "dead" Analyzer problem.
- Turn Brightness and Contrast controls fully clockwise.
- Verify Monitor Power and Power Cord.
- With Power off, check Video Cable, re-seat all Computer Connectors, re-seat VGA Board.
Problem Corrected ?
YES
NO
Total Call
- Connect Monitor to Laptop. See Figure
- Verify Laptop information displays on Monitor.
Information Displays ?
YES
NO
- Replace VGA Board (PL-17.2).
- Replace Monitor (PL-17.3).
Data Station CRT
Attach Video Cable From CRT to Laptop External Monitor Port
Laptop Computer
32101

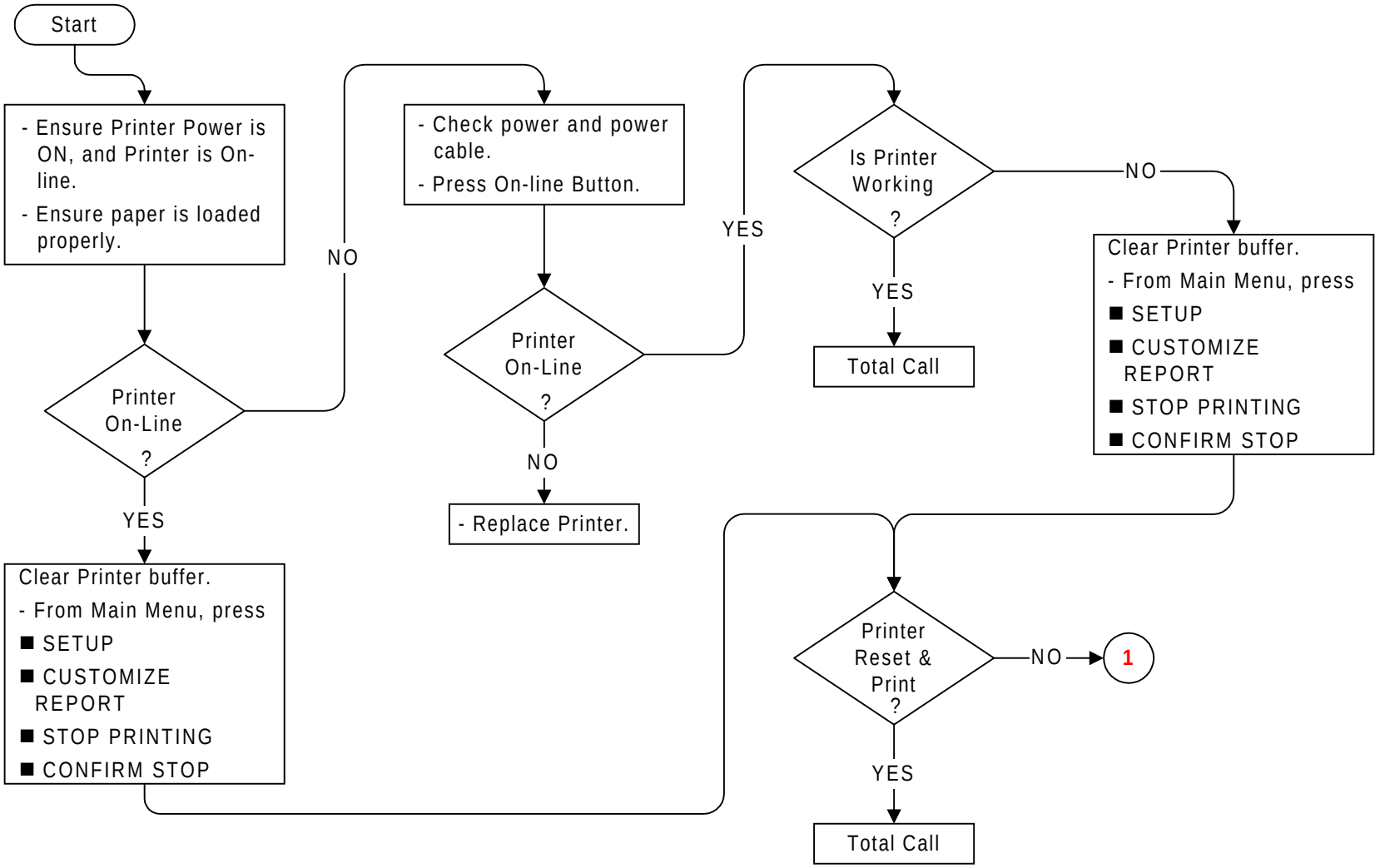
IP-24 HSSL Failures/Message Reception Time-Out (Page 1 of 1)


Start
- With Power OFF, check and re-seat connectors on the CPU/DCM, and Main Computer.
- Re-seat the HSSL Board.
- Check and re-connect the HSSL Cable.
- Reload HSSL Com (VP-67)
Problem Corrected ?
NO
- In order replace the following.
- HSSL Cable (PL-17.3)
- CPU/DCM (PL-13)
- Serial Link/Keyboard Controller (PL-17.2)
YES
Total Call

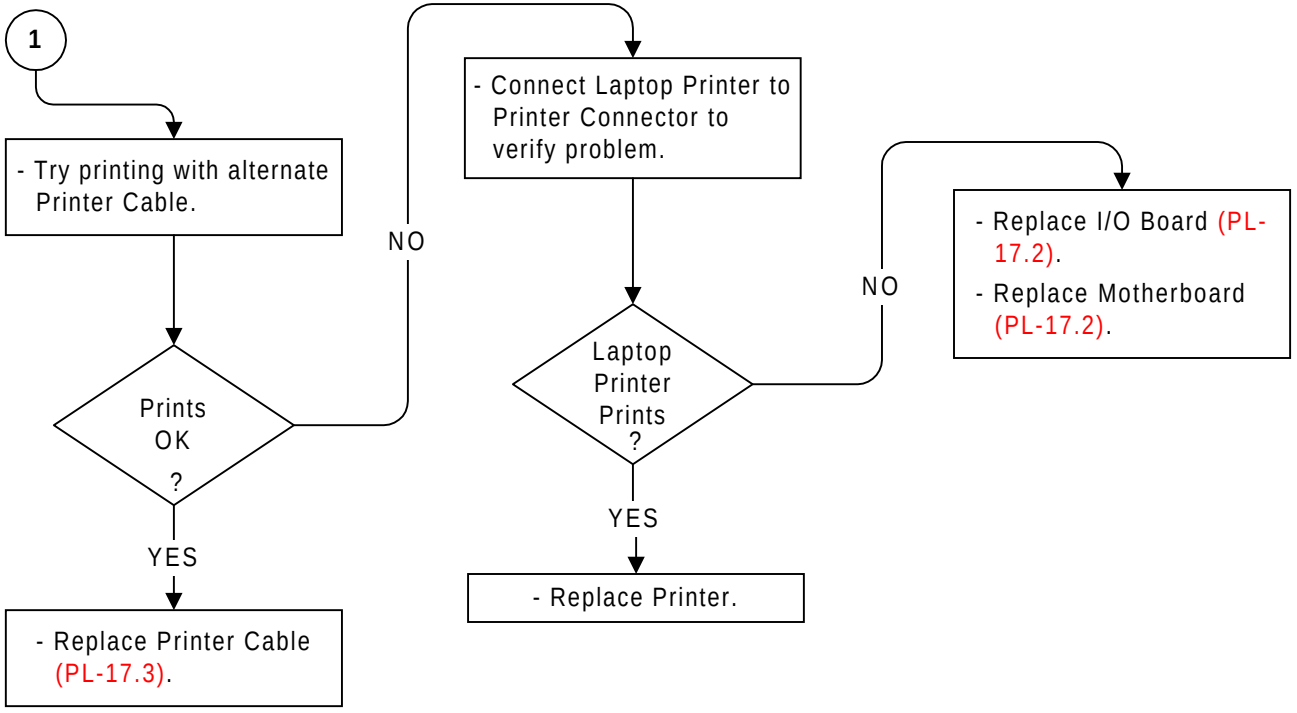
IP-25 Hard Drive Errors (Page 1 of 1)



IP-26 Printer Errors (Page 1 of 2)



IP-26 Printer Errors (Page 2 of 2)



IP-27 Sample Loader & Aspiration Tower Error Messages

Error Message	Associated VP(s)	Associated Components	Parts List(s)
Mix Head stuck in angle position	VP-36	Stepper Motor, Home Sensor, SHM 2	PL-18.2, PL-18.1
Mix Head stuck in vertical position	VP-36	Stepper Motor, Home Sensor, SHM 2	PL-18.2, PL-18.1
Mix Head not at top position	VP-35	Up/Down Air Cylinder, Sensor, Valve 3, SHM 2	PL-18.1, PL-18.2, PL-18.3
Mix Head stuck at top position	VP-35	Up/Down Air Cylinder, Sensor, Valve 3, SHM 2	PL-18.1, PL-18.2, PL-18.3
Load zone empty detector malfunction	VP-.39	Sensor, SHM 2	PL-18.2, PL-18.3
Unload zone full detector malfunction	VP-39	Sensor, SHM 2	PL-18.2, PL-18.3
Unload zone nearly full detector malfunction	VP-39	Sensor, SHM 2	PL-18.2, PL-18.3
Tube stuck in position 3	VP-38	Tube Sensor Board, Rack Advance Cylinder, Valve 1, SHM 2	PL-18.2, PL-18.3
Probe stuck at home position	VP-31	Aspiration Tower, Home Sensor, Needle SHM 1	PL-6.1, PL-8
Probe unable to reach home position	VP-31	Aspiration Tower, Home Sensor, Needle SHM 1	PL-6.1, PL-8
Invalid tube height	VP-34	Aspiration Tower, Sensors S1/S2, SHM 1	PL-6.1, PL-8
Unload area hardware malfunction	VP-38, VP-39	Unload Side Sensors, SHM 2	PL-18.2, PL-18.3
Tube dropped during mixing	VP-37	Mixer Head, Valve 4, Regulator, SHM 2	PL-18.1, PL-18.2, PL-18.3
Mix Zone Rack position error	VP-38	Rack Index Cylinder, Valve 1, SHM 2	PL-18.1, PL-18.3
Unexpected tube in position 4 after Rack advance	VP-38	Tube Sensor Board, SHM 2	PL-18.1, PL-18.2
Tube lost moving from position 3 to position 4	VP-38	Tube Sensor Board, SHM 2	PL-18.1, PL-18.2
Rack barcode read failure	VP-40	Rack Barcode Label	

IP-27 Sample Loader & Aspiration Tower Error Messages

Error Message	Associated VP(s)	Associated Components	Parts List(s)
Tube position barcode read failure	VP-40	Rack Position Barcode Labels	
Barcode reader failure	VP-33, VP-11	Barcode Reader, Aspiration Tower, SHM 2	PL-18.2, PL-6.1, PL-18.1

Appendix 2A - Cable Connection Diagram

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Figure 2A-1 Cable Connection Diagram, SL

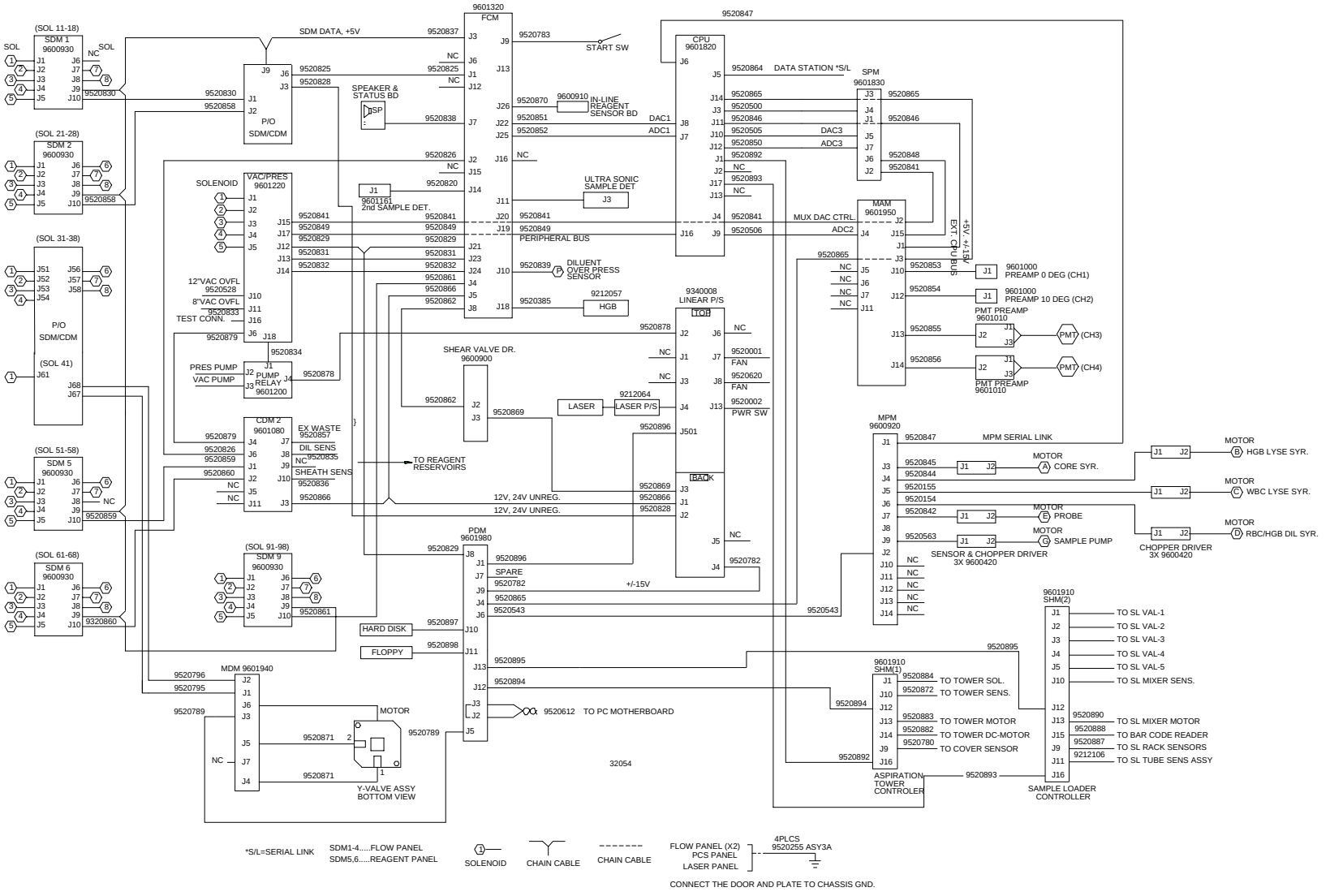

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Figure 2B-6 Solenoid Driver Modules 5, 6, 9 7
Figure 2B-7 Motor Driver Block Diagram 8
Figure 2B-8 CS Sensor Interface Block Diagram 9
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Figure 2B-1 Figure 2B-1ADC Block Diagram

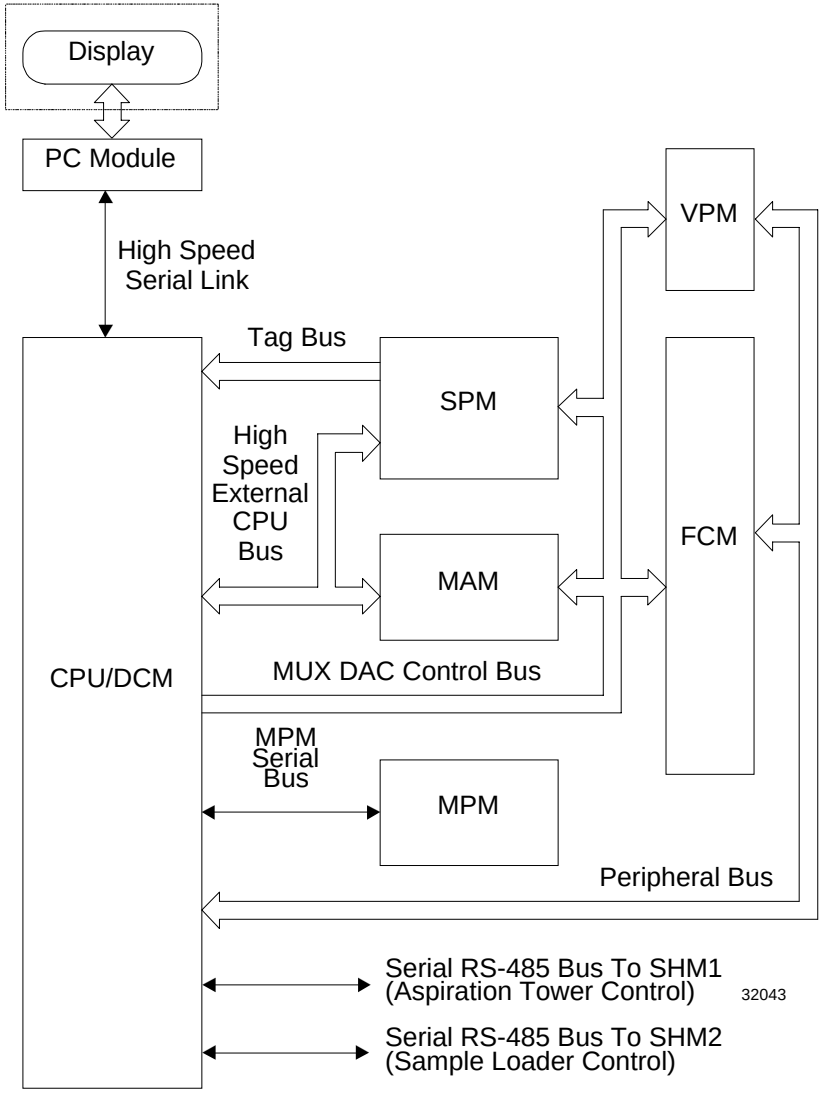


Figure 2B-2 ADC Block Diagram

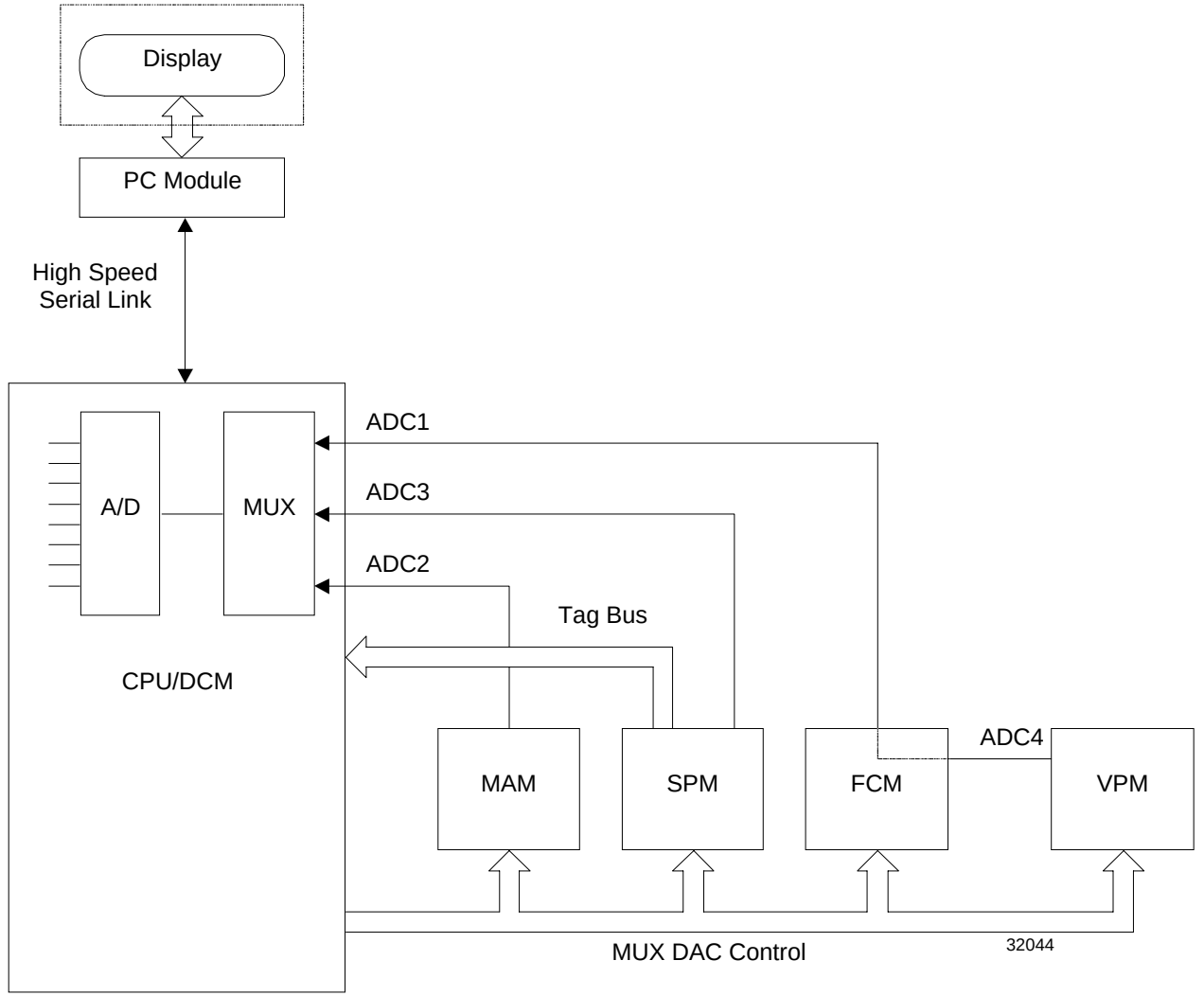


Figure 2B-3 DAC Block Diagram

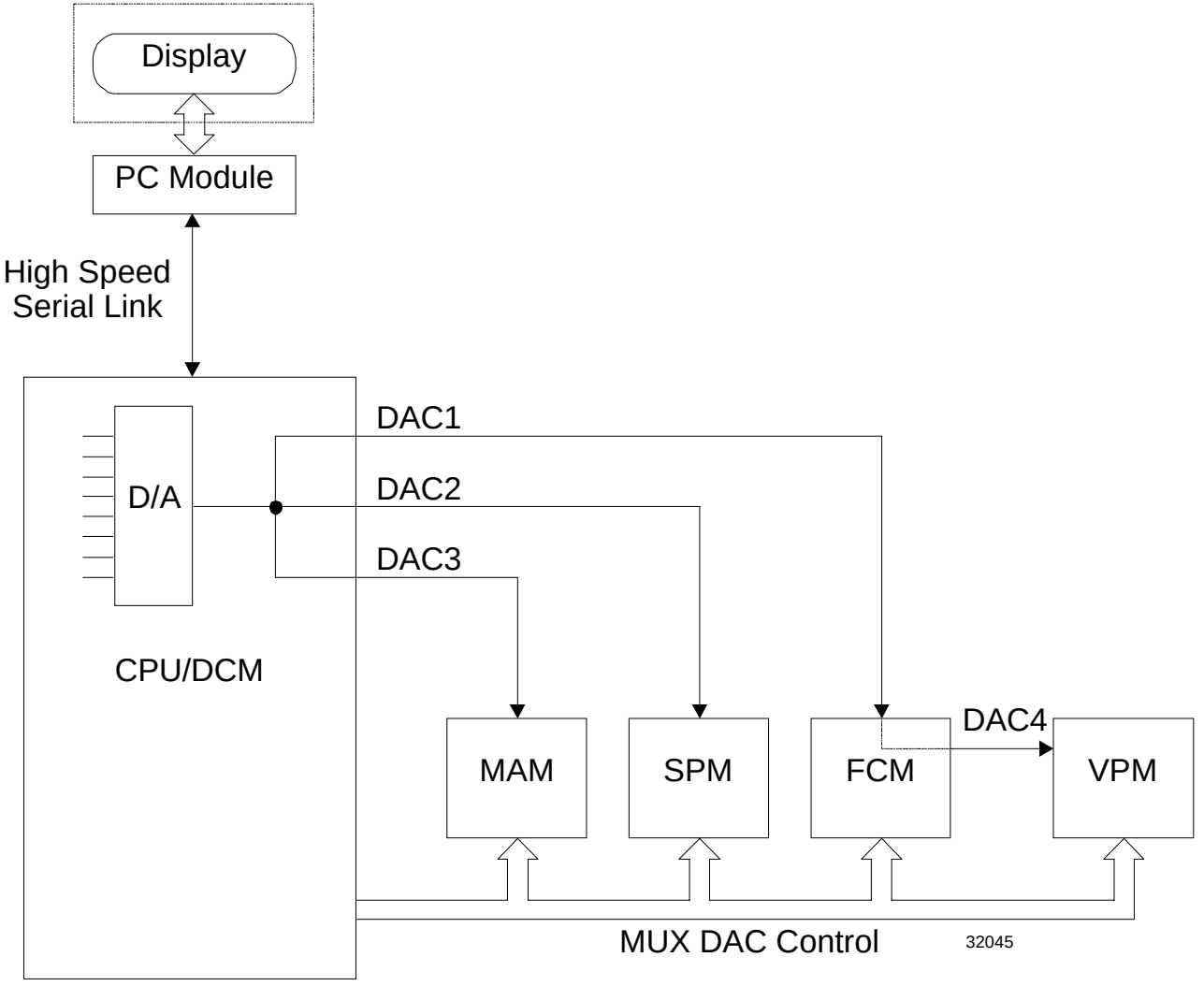


Figure 2B-4 Measurement & Subsystem Block Diagram

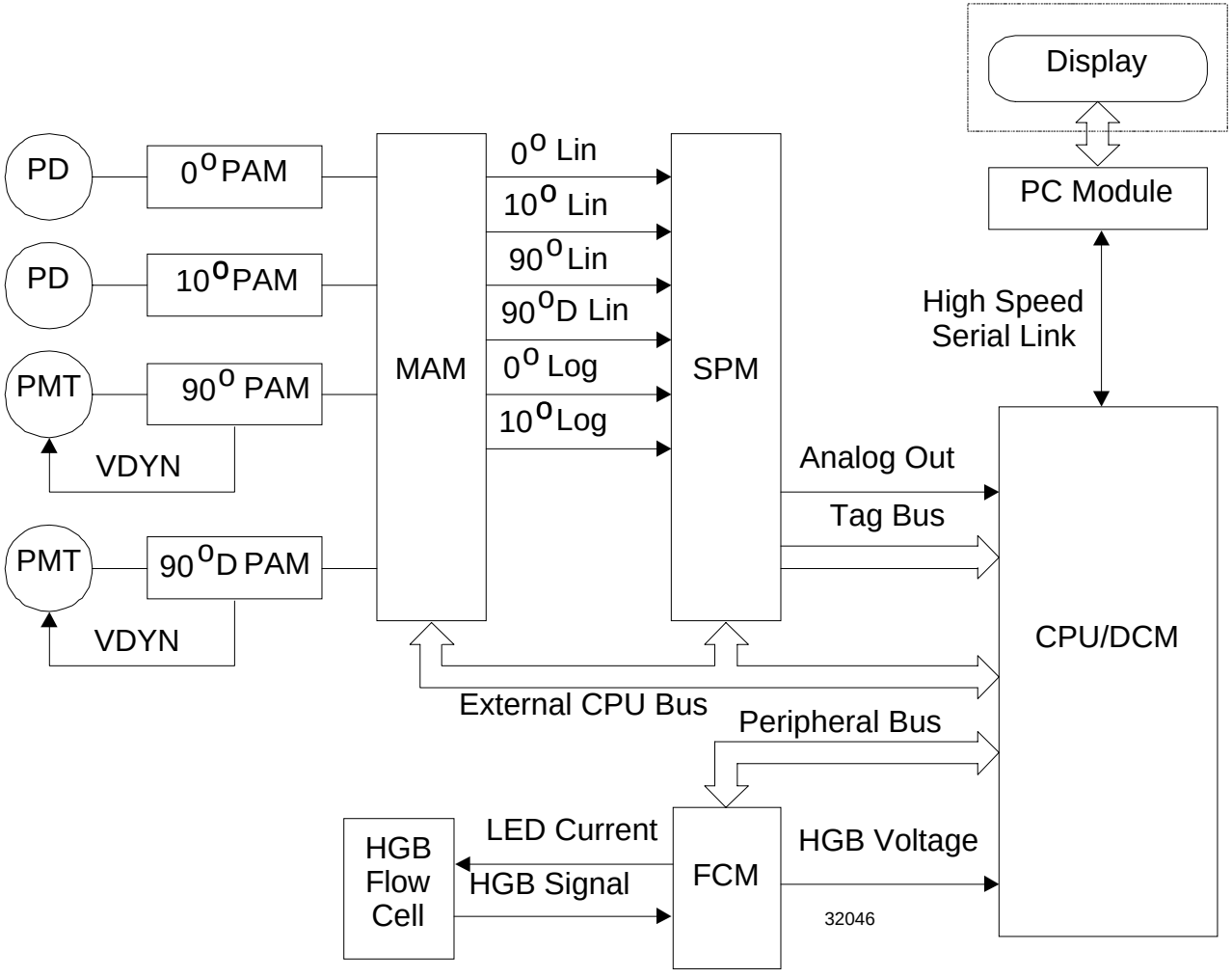


Figure 2B-5 Solenoid Driver Modules 1, 2 & SDM/CDM

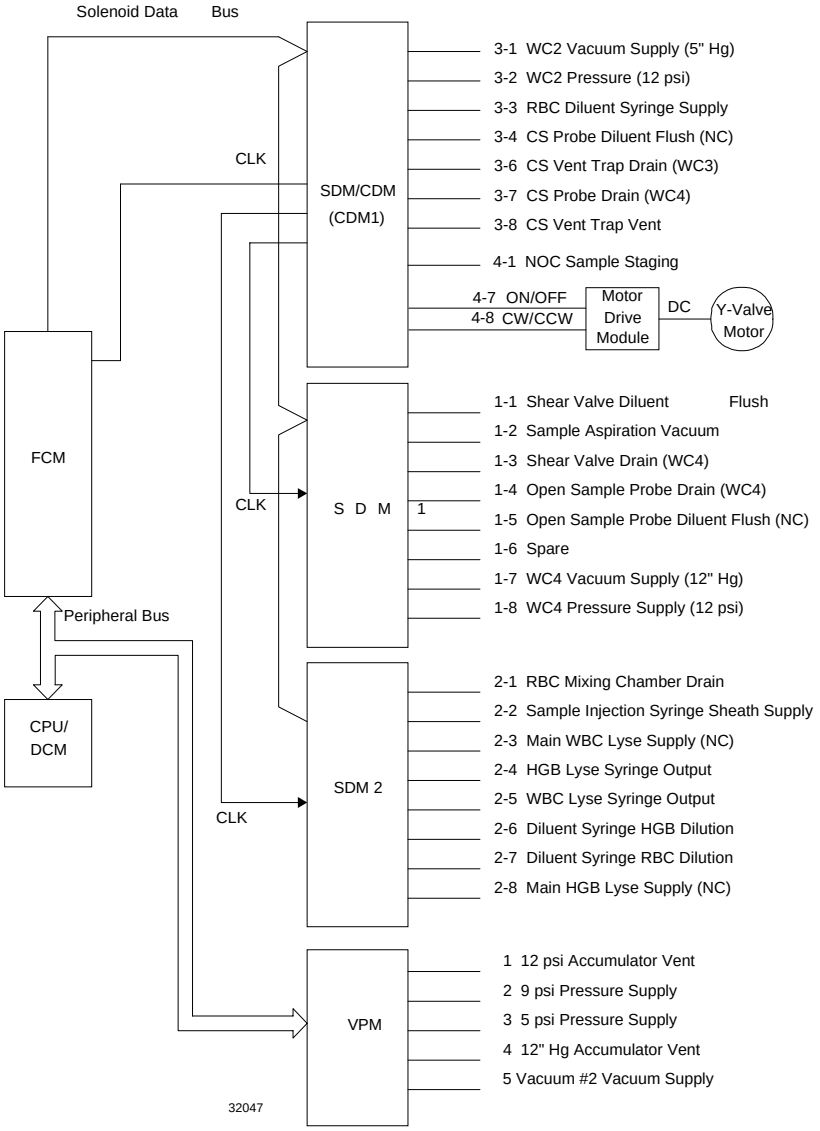


Figure 2B-6 Solenoid Driver Modules 5, 6, 9

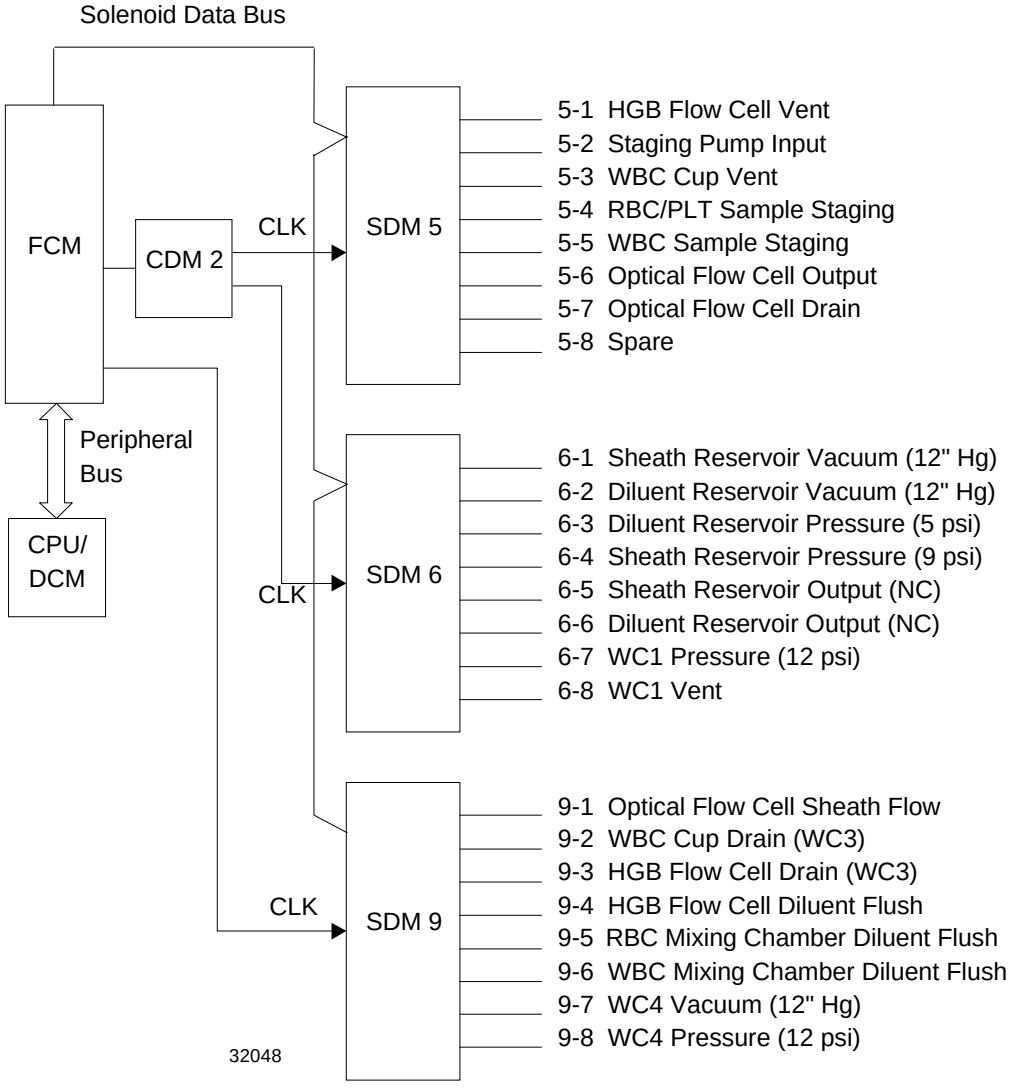


Figure 2B-7 Motor Driver Block Diagram

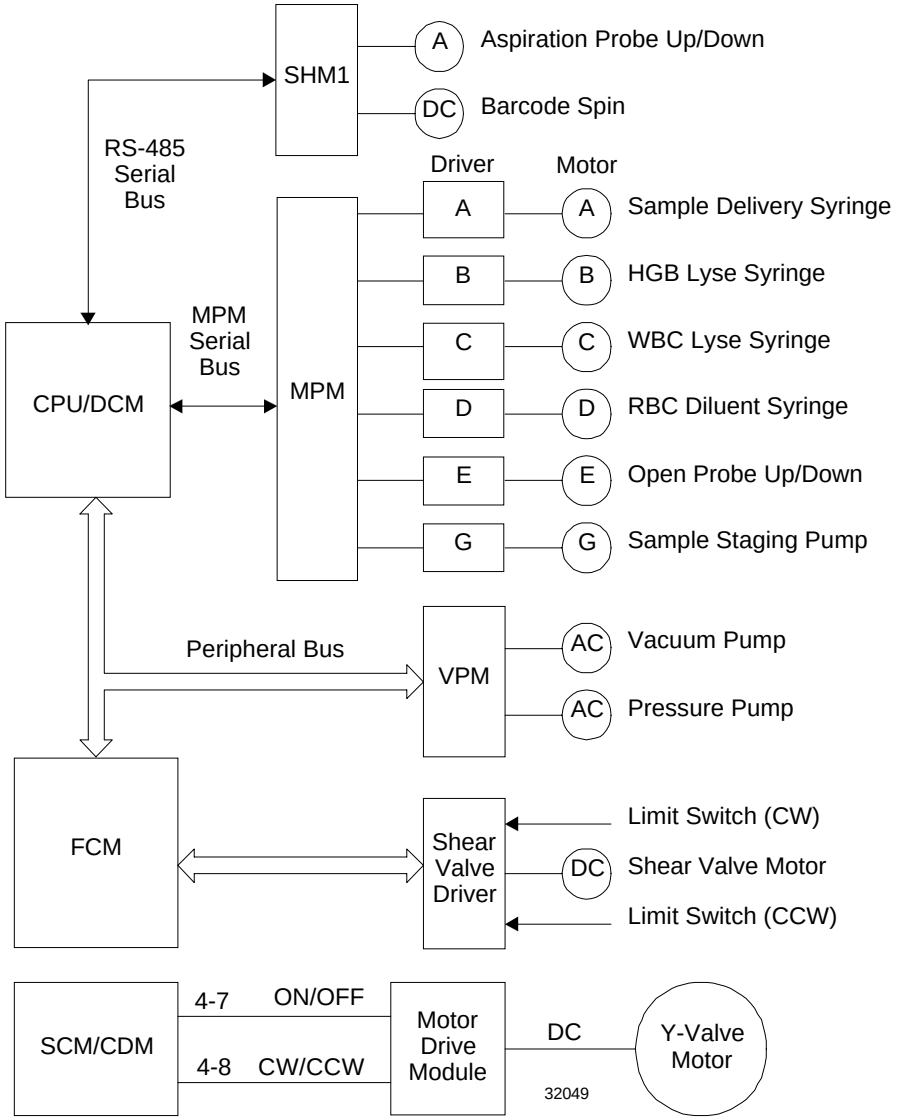


Figure 2B-8 CS Sensor Interface Block Diagram

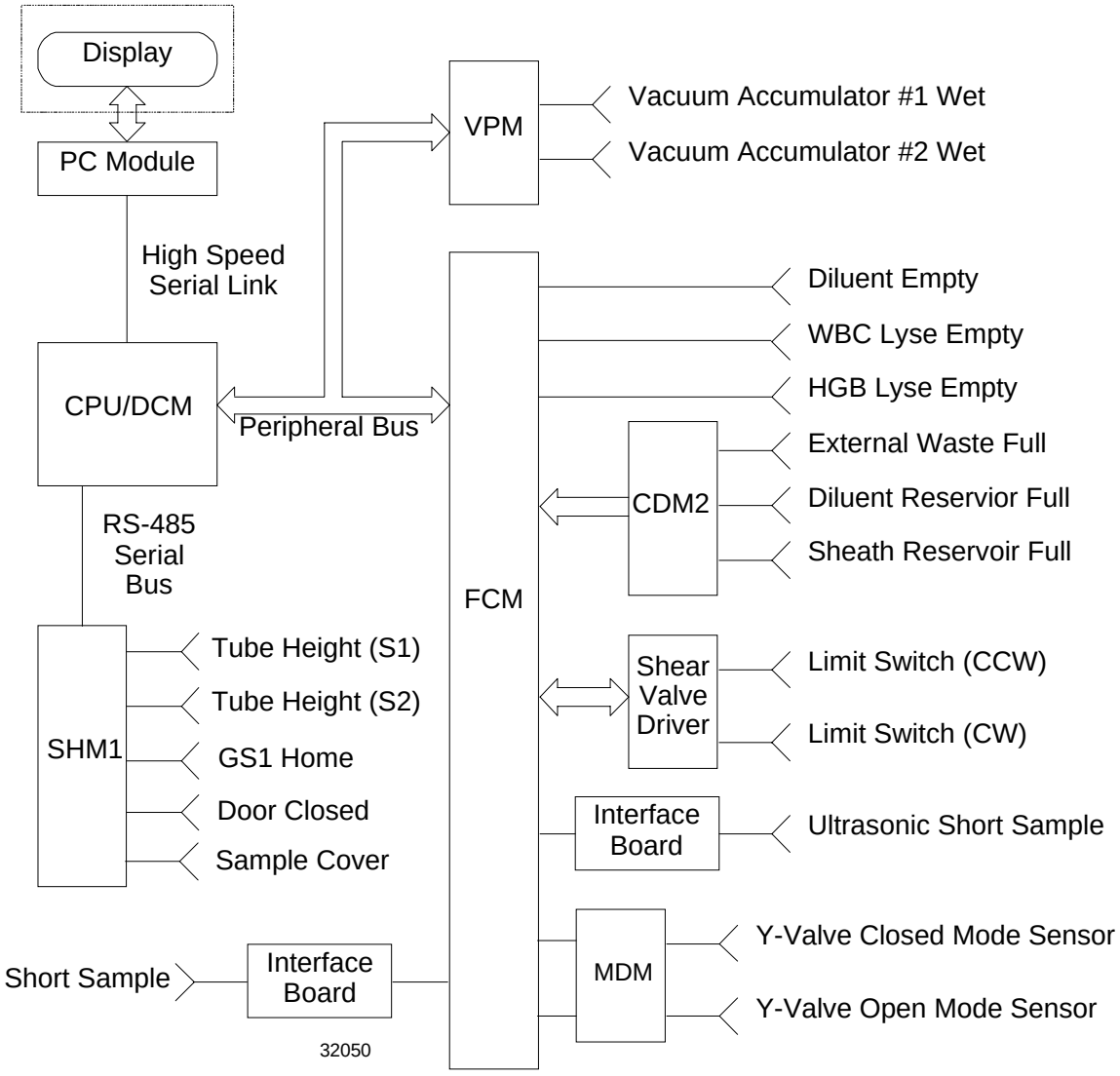


Figure 2B-9 S/L Sensor Interface Block Diagram

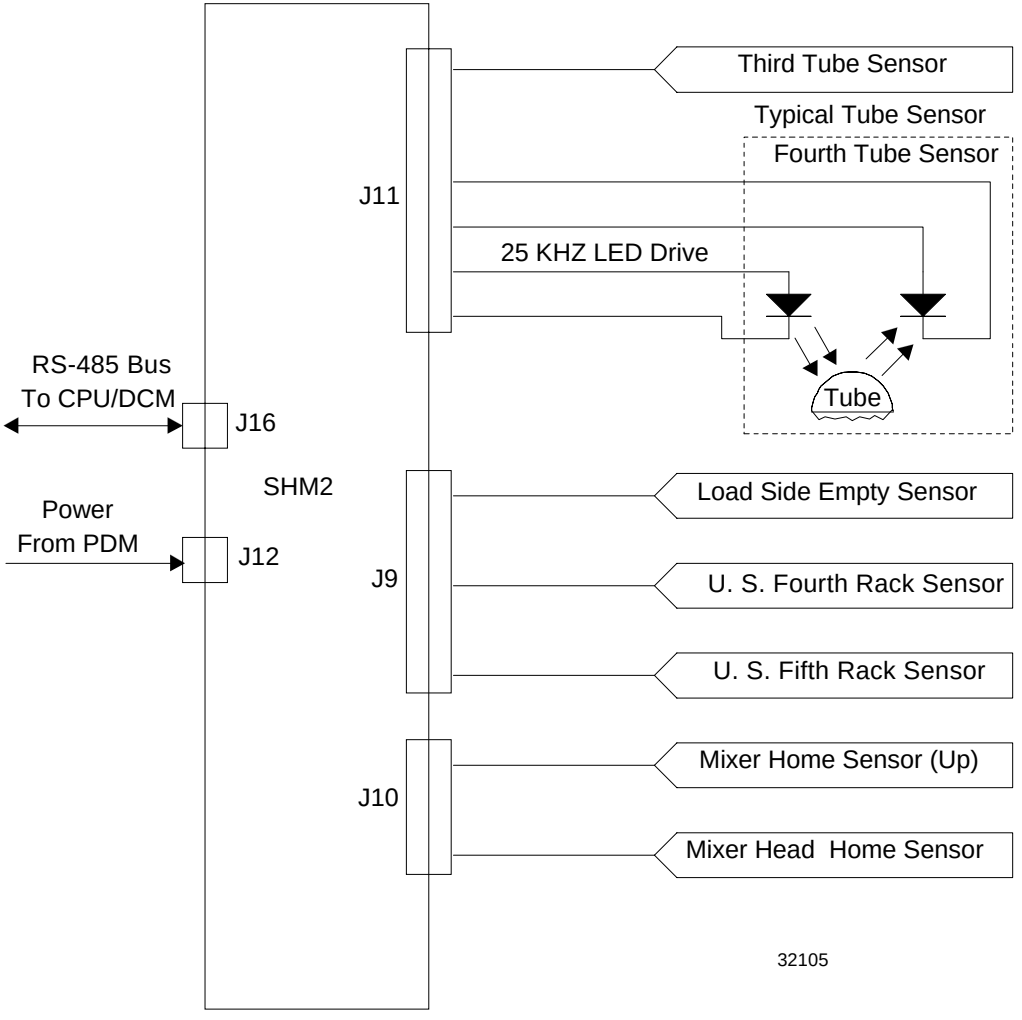


Figure 2B-10 Vacuum/Pressure Block Diagram

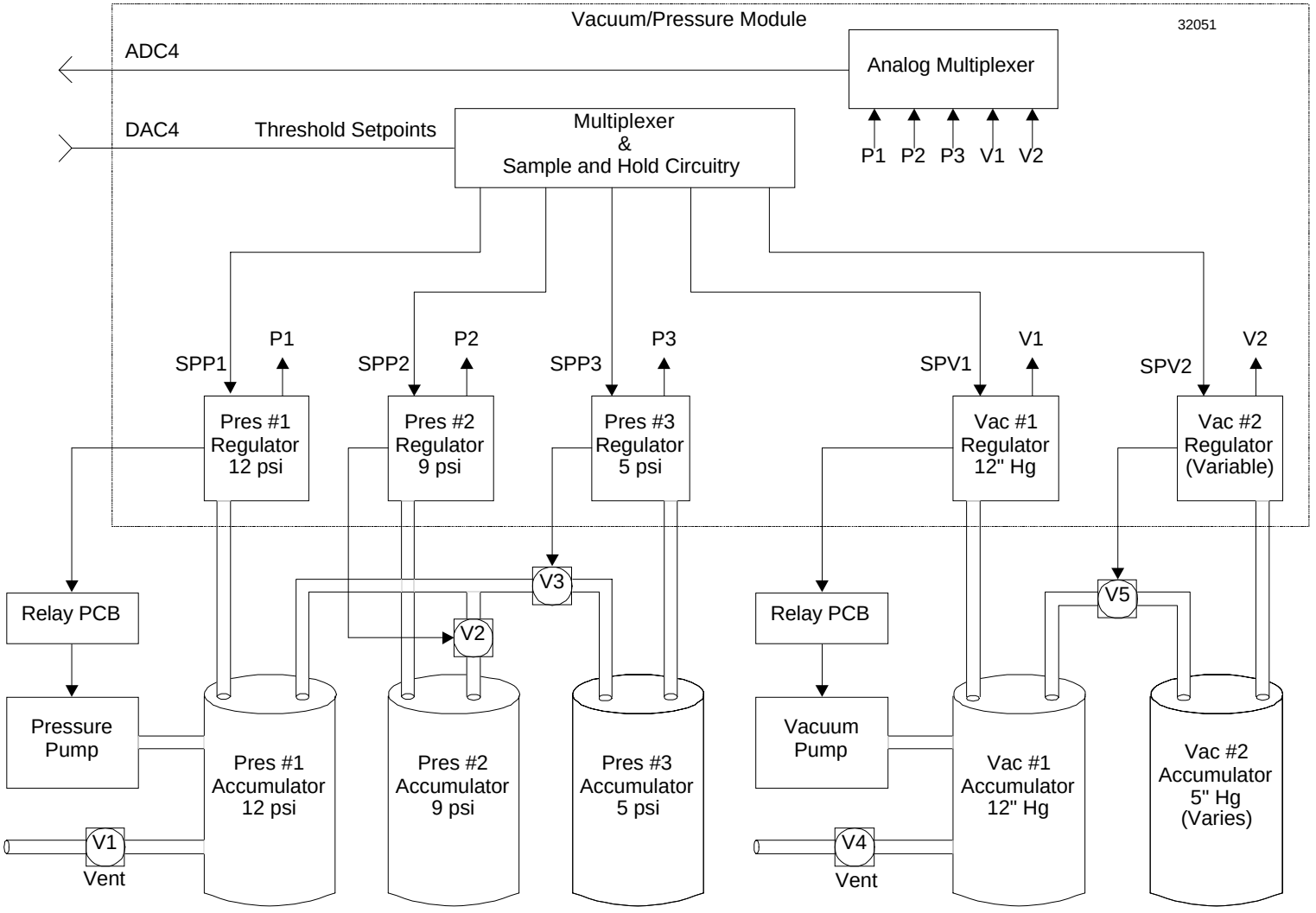


Figure 2B-11 Power Distribution Block Diagram

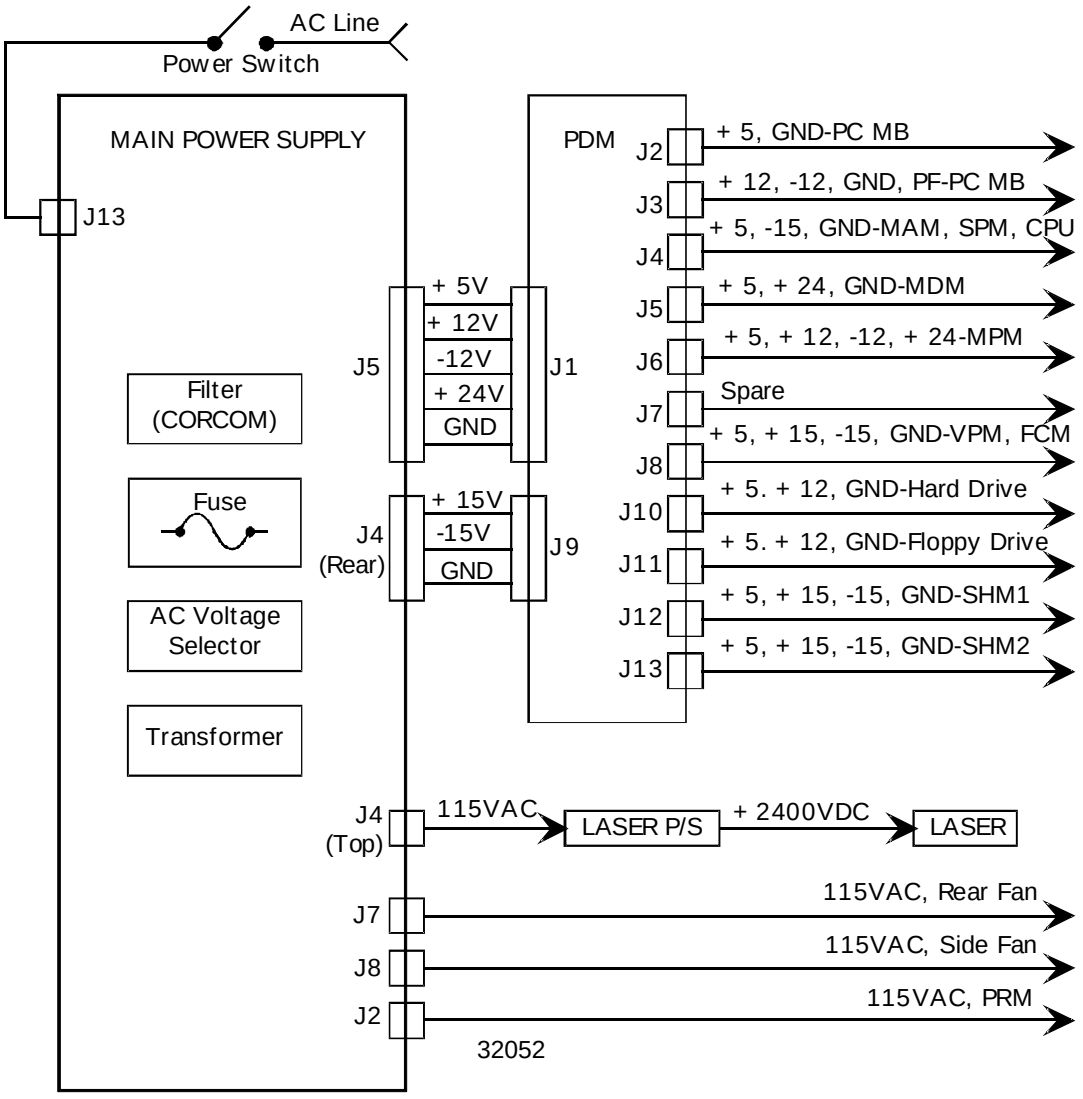


Figure 2B-12 Computer Block Diagram

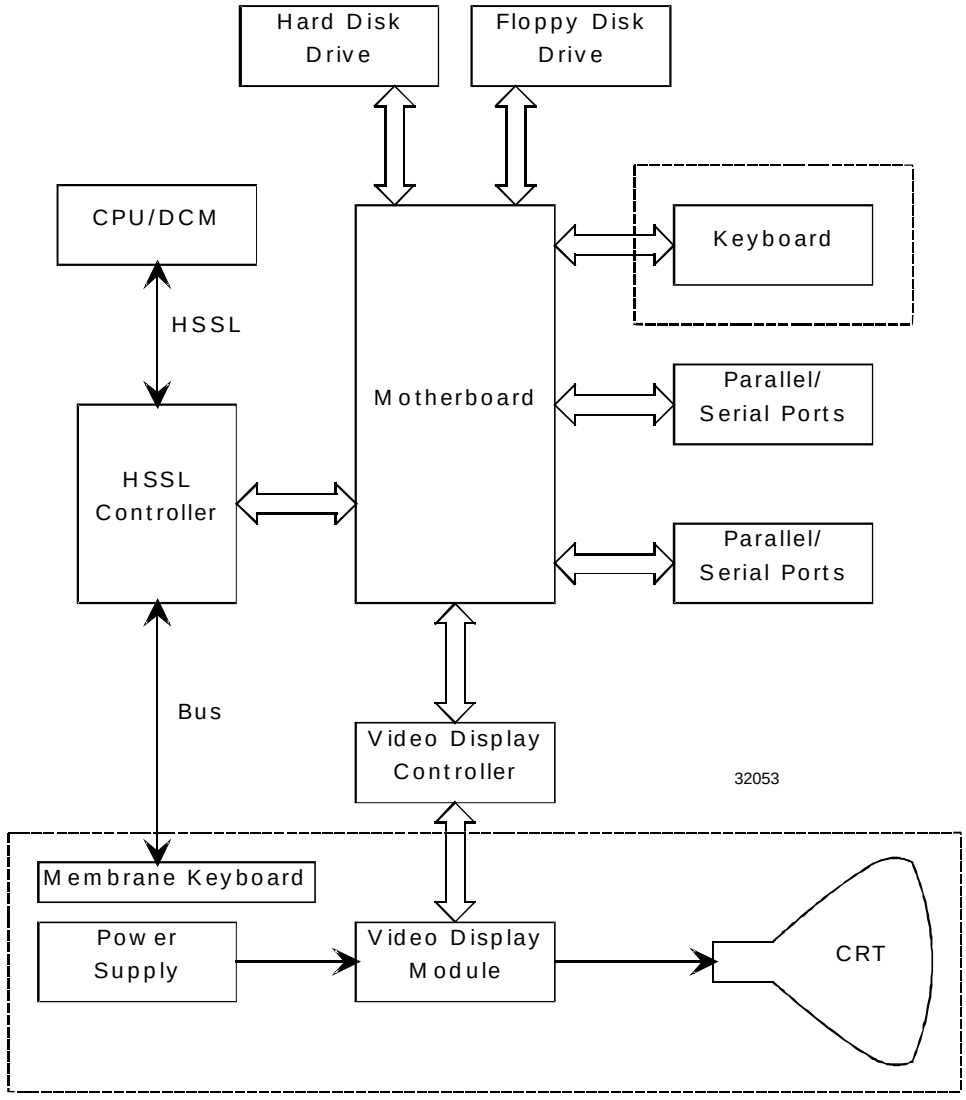


Figure 2B-13 Measurement Block Diagram

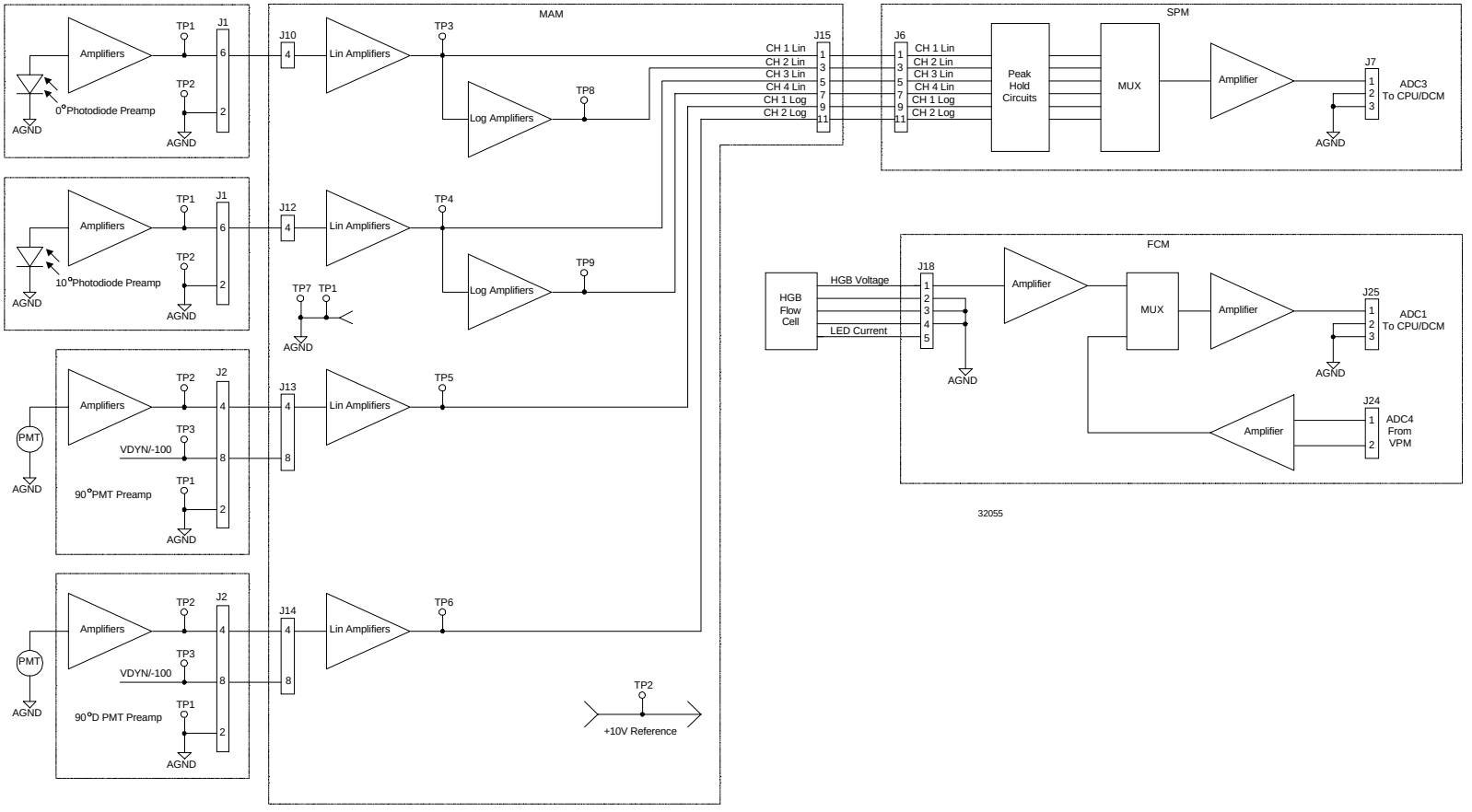


Figure 2B-14 Solenoid Control Block Diagram

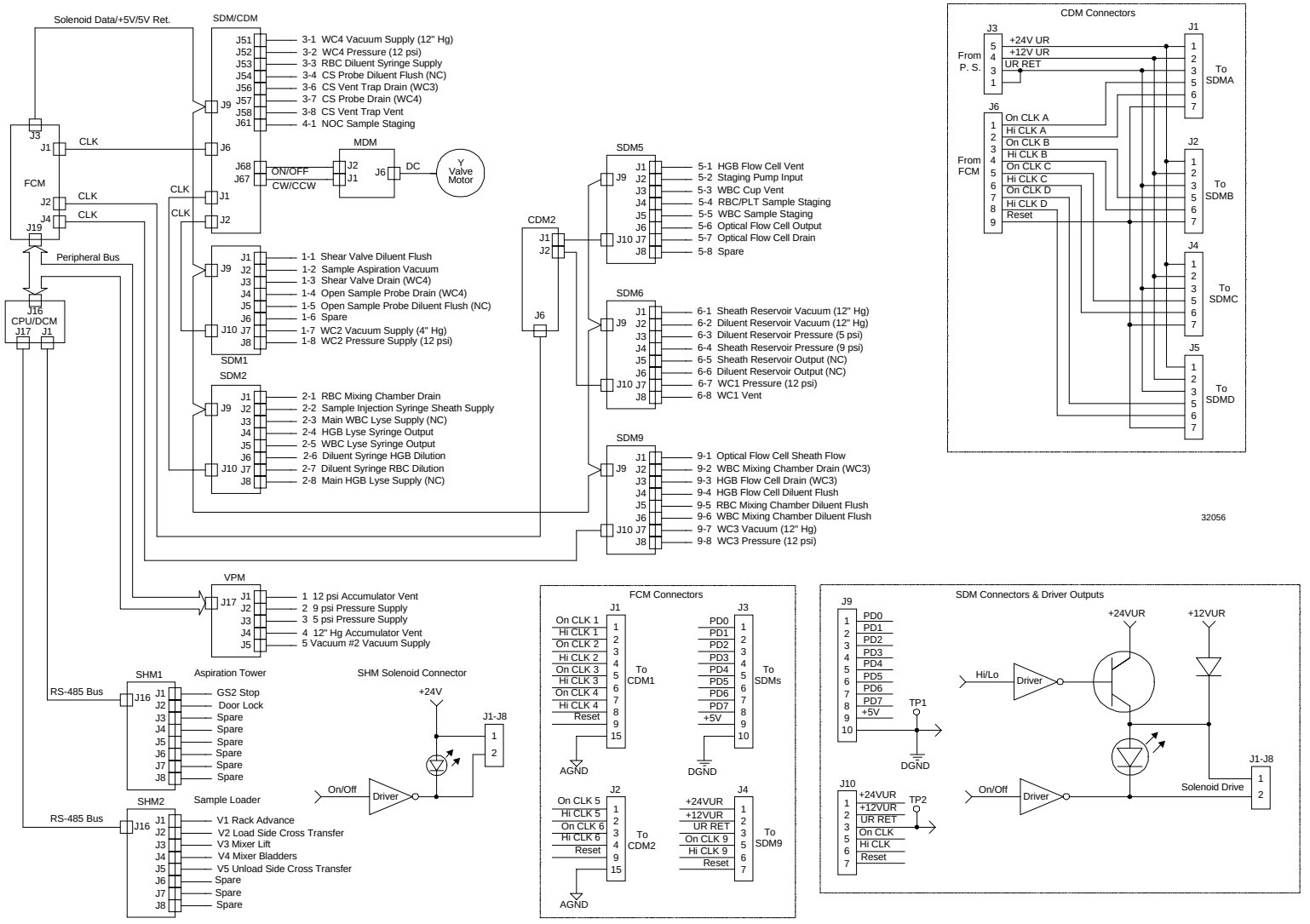


Figure 2B-15 Motor Control Block Diagram

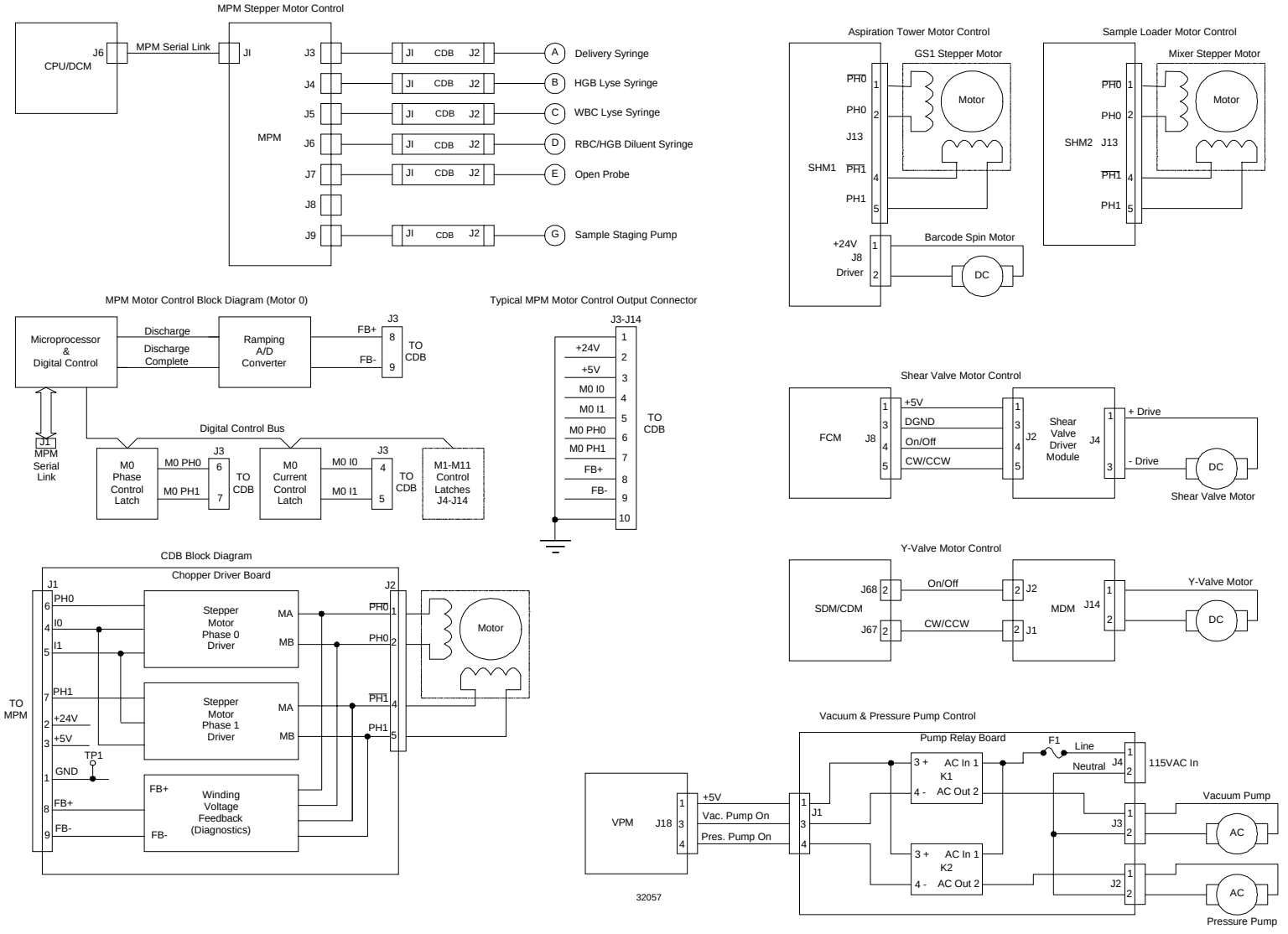


Figure 2B-16 Sensor Block Diagram

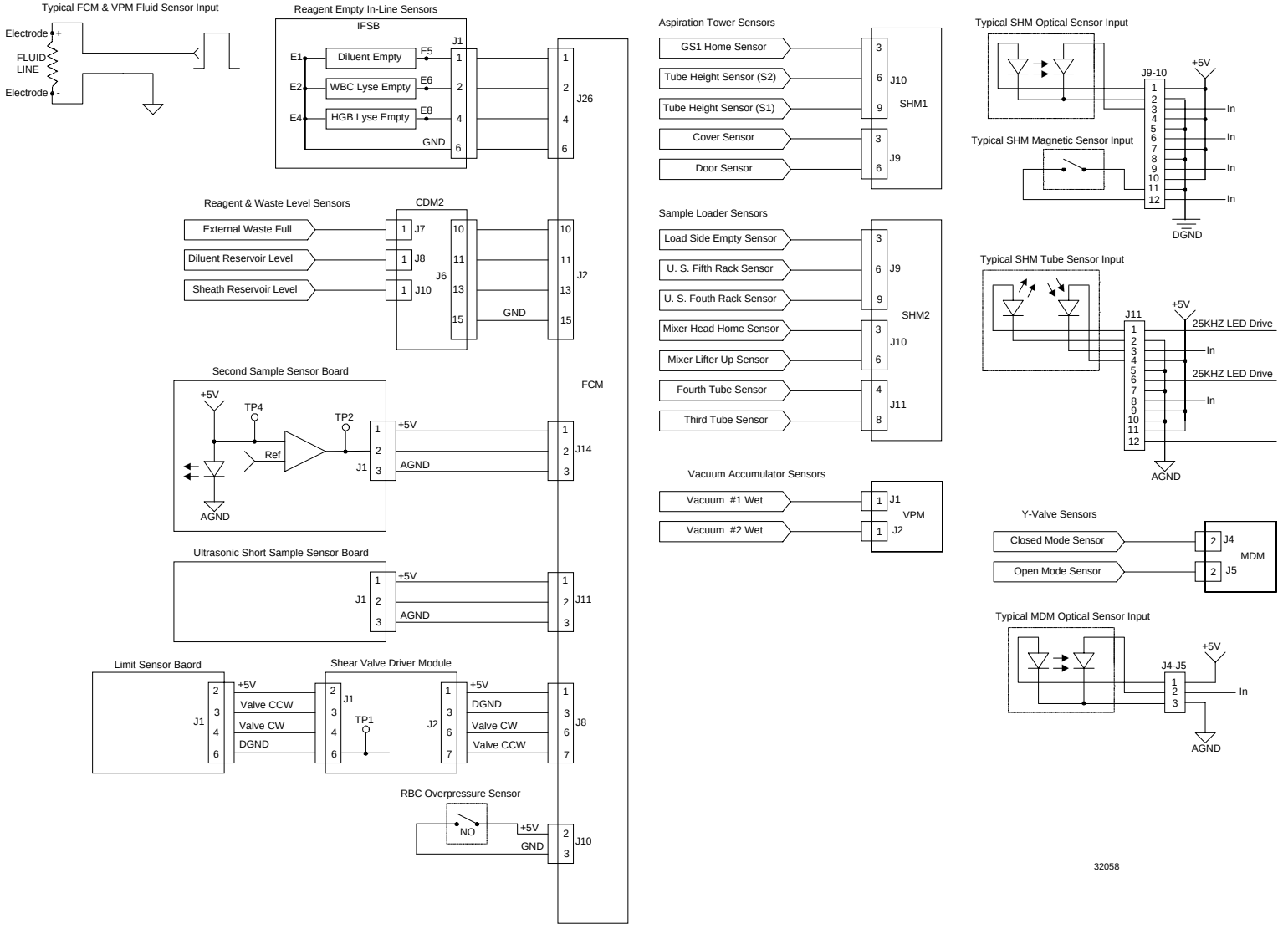


Figure 2B-17 Power Distribution Block Diagram

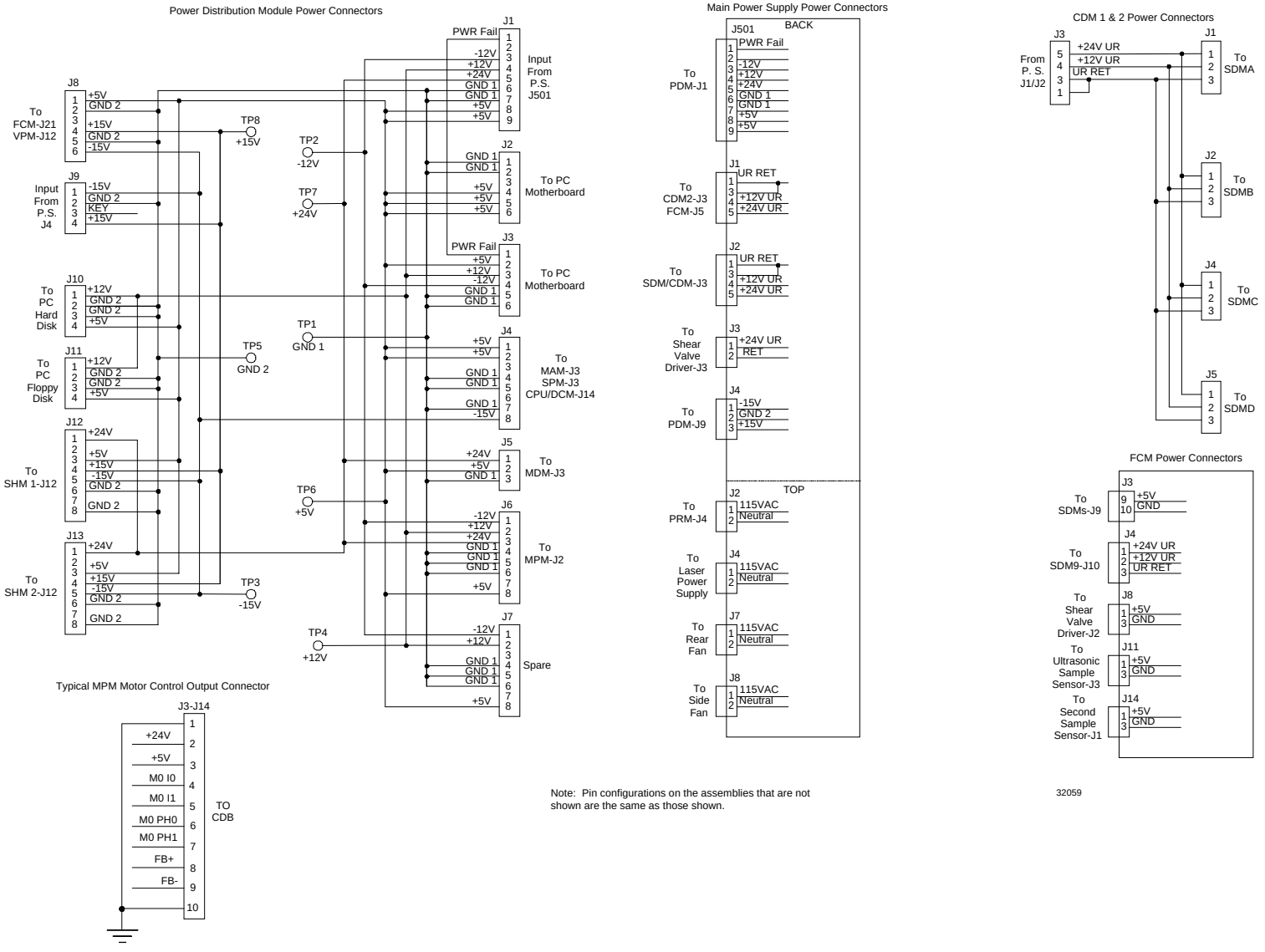


Figure 2B-18 Normal 10, 90 and 0, 90D Scattergrams

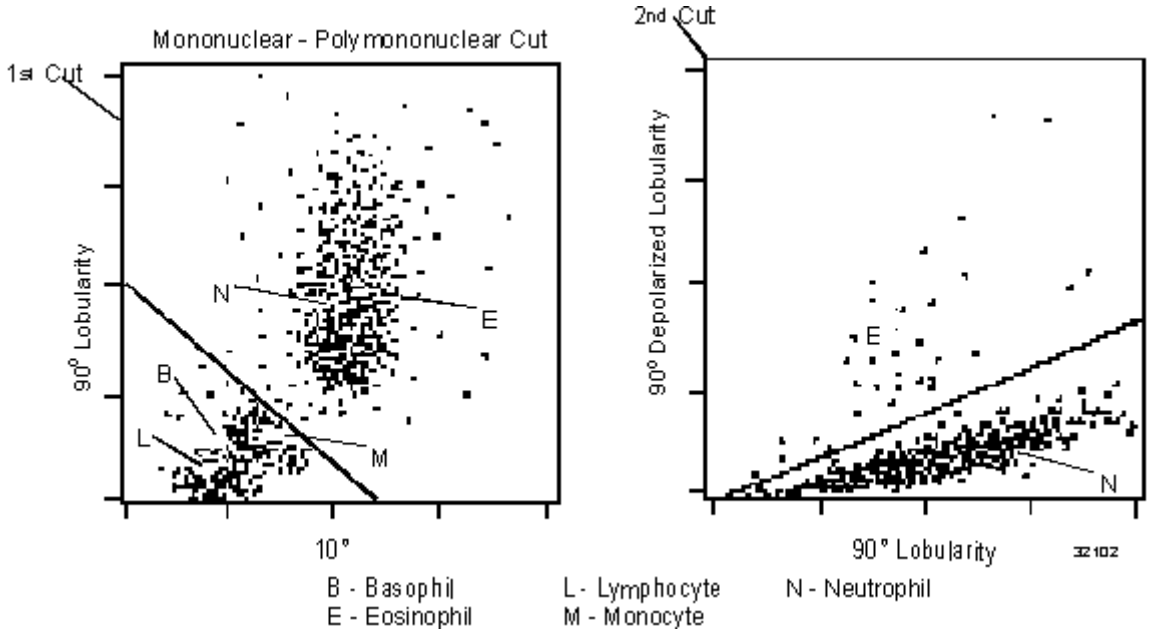
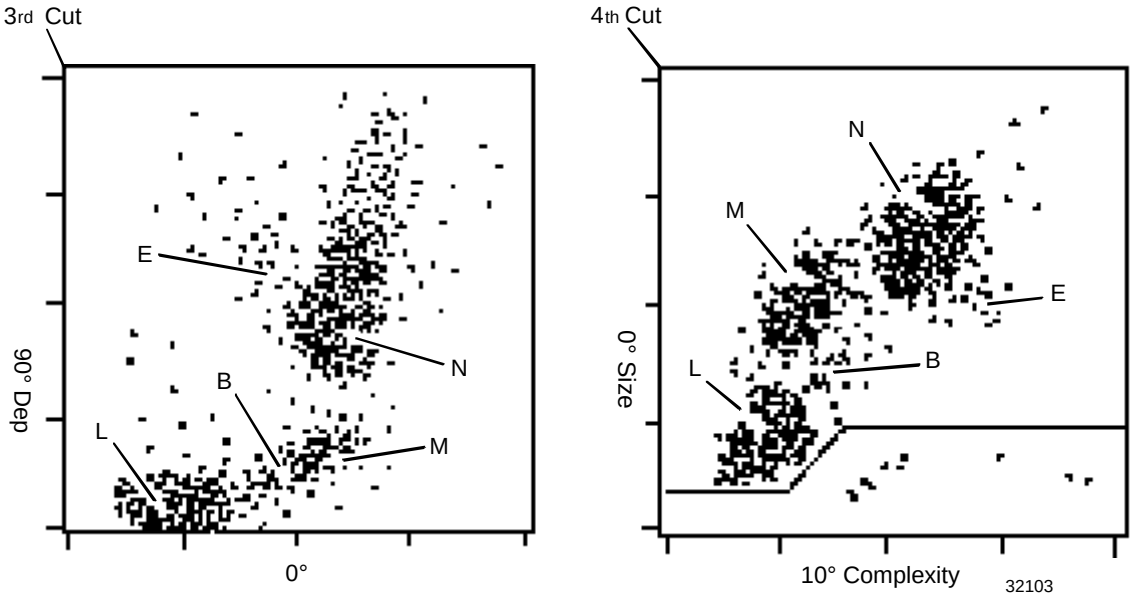
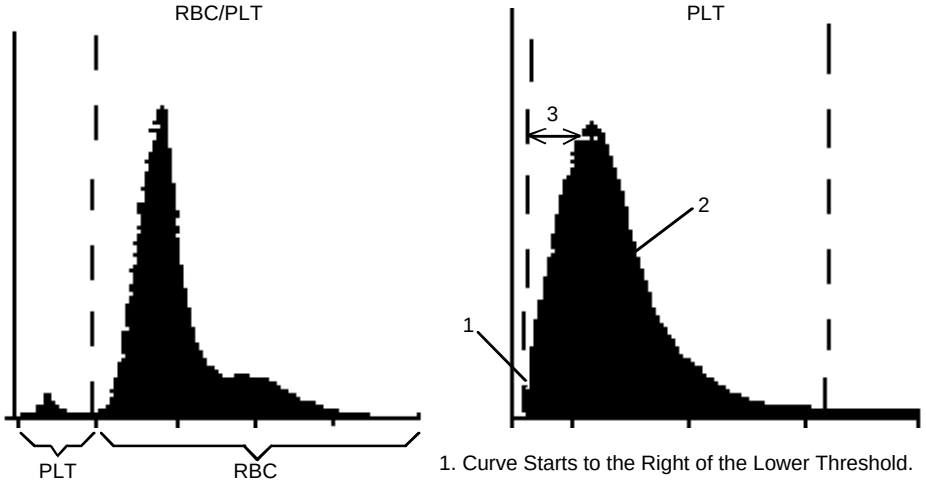


Figure 2B-19 Normal 10, 90 and 0, 90D Scattergrams



B - Basophil L - Lymphocyte N - Neutrophil
E - Eosinophil M - Monocyte

Figure 2B-20 Normal PLT and RBC Histograms



1. Curve Starts to the Right of the Lower Threshold.
2. Single Peak
3. Good Distance From Lower Threshold at Peak

Appendix 2C - System Flow Diagrams

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Figure 2C-1 Flow Diagram, Complete

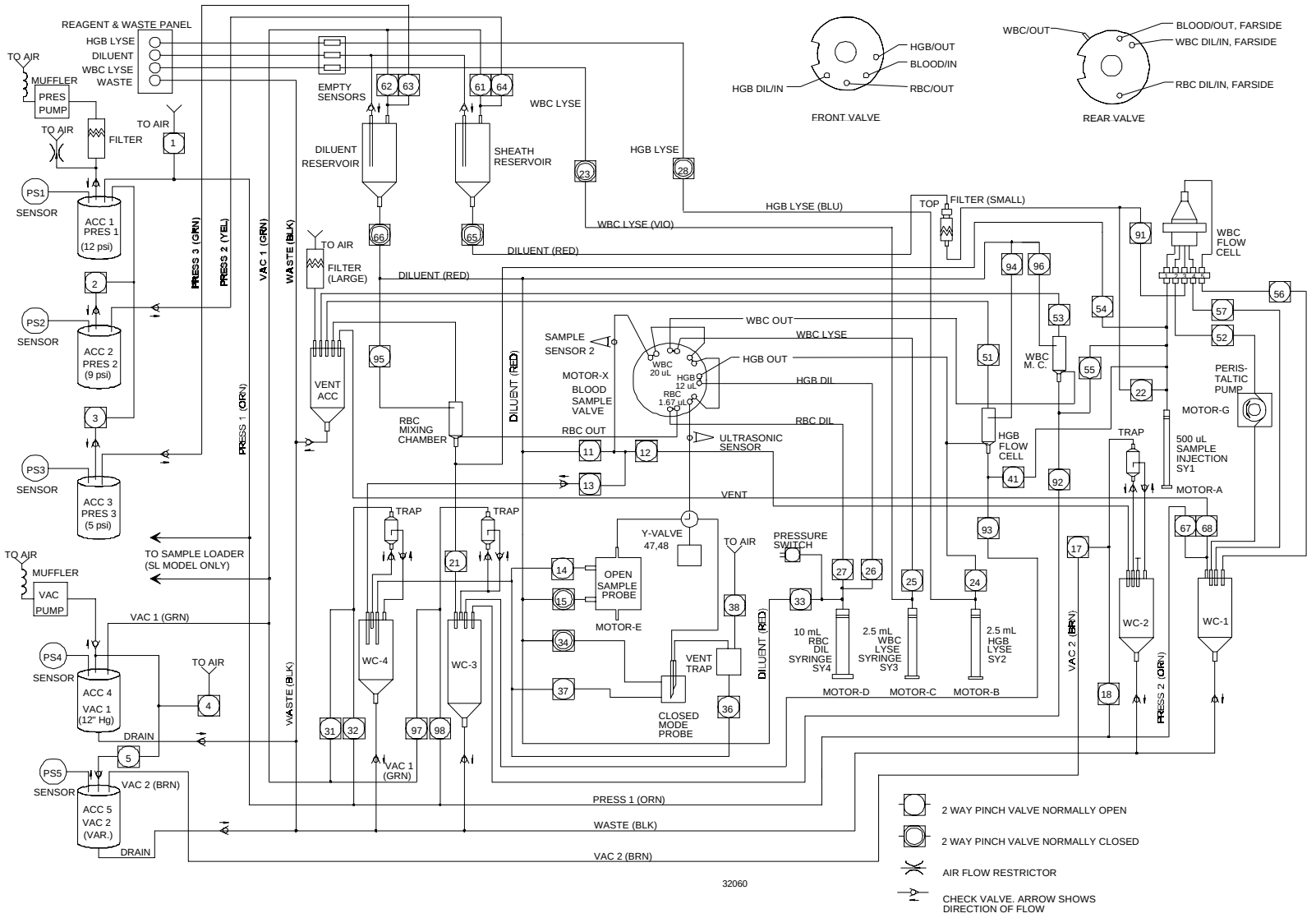


Figure 2C-2 Sample Loader Flow Diagram

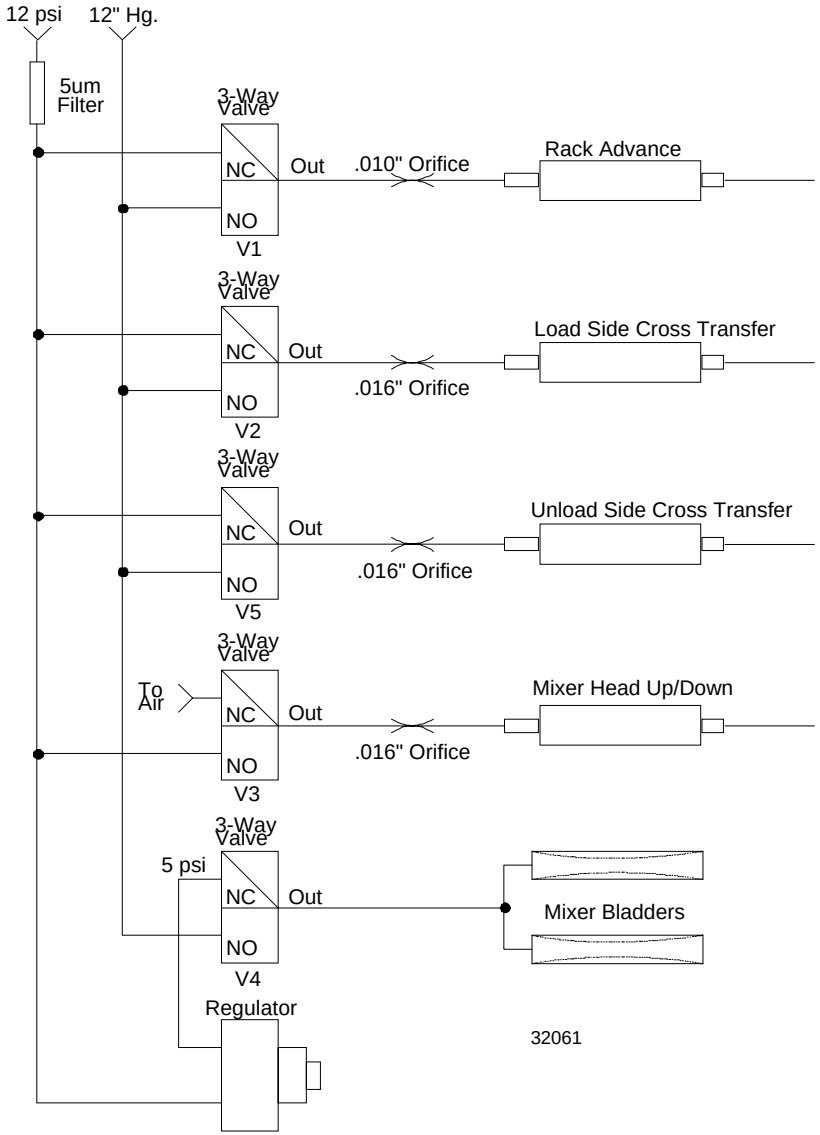


Figure 2C-3 *V*acuum/Pressure Flow Diagram

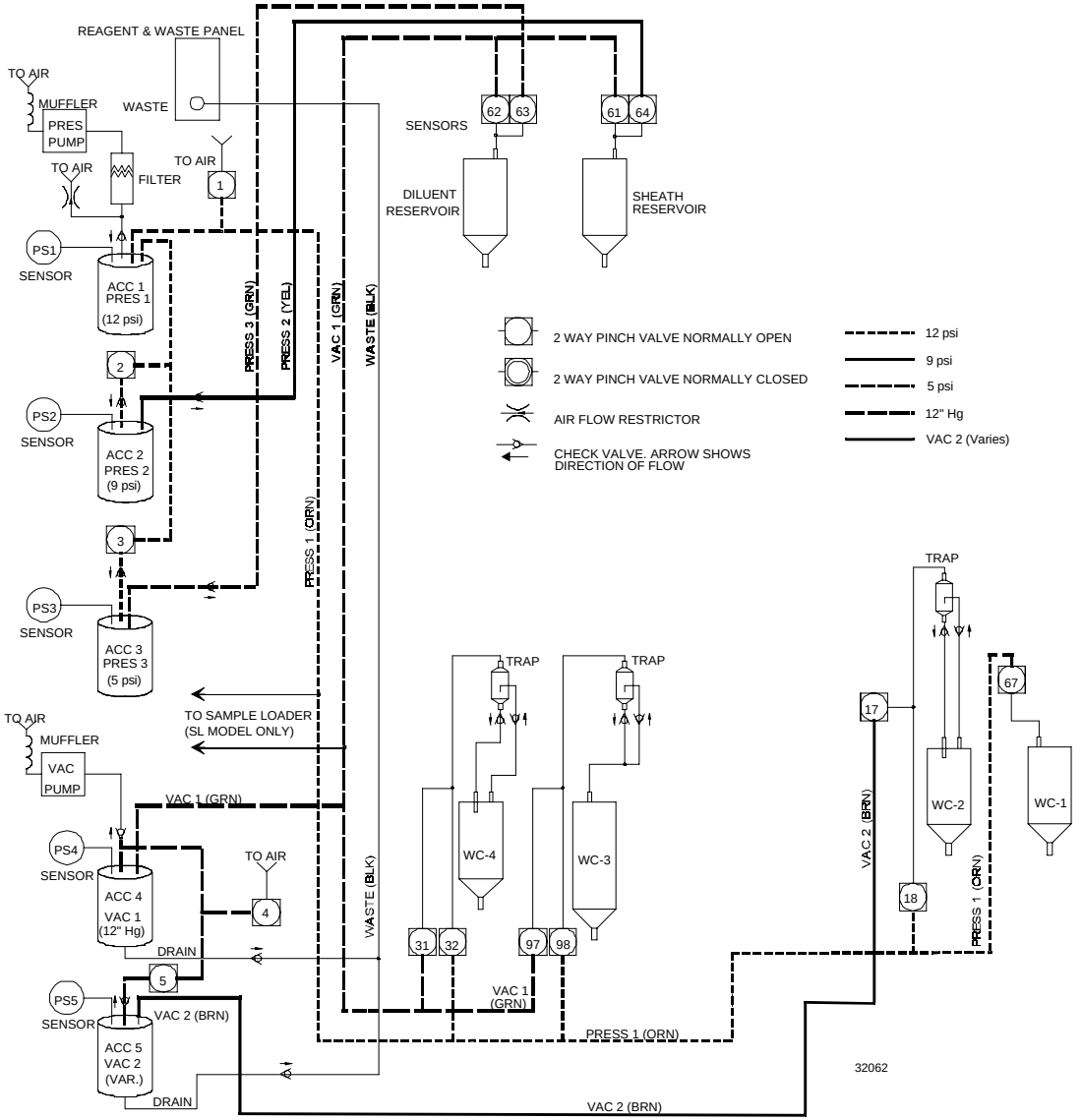


Figure 2C-4 Reagent Flow Diagram

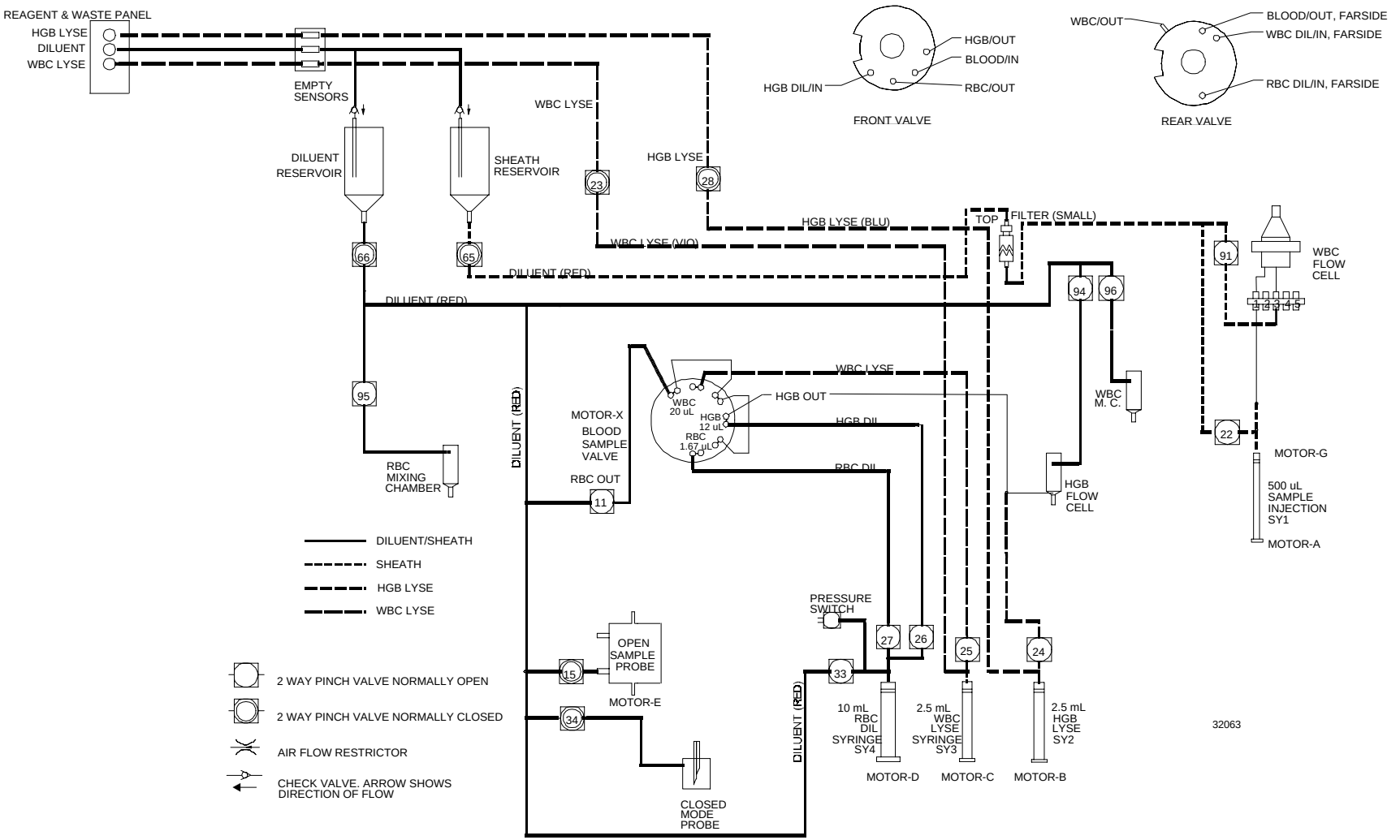


Figure 2C-5 Sample Aspiration Flow Diagram

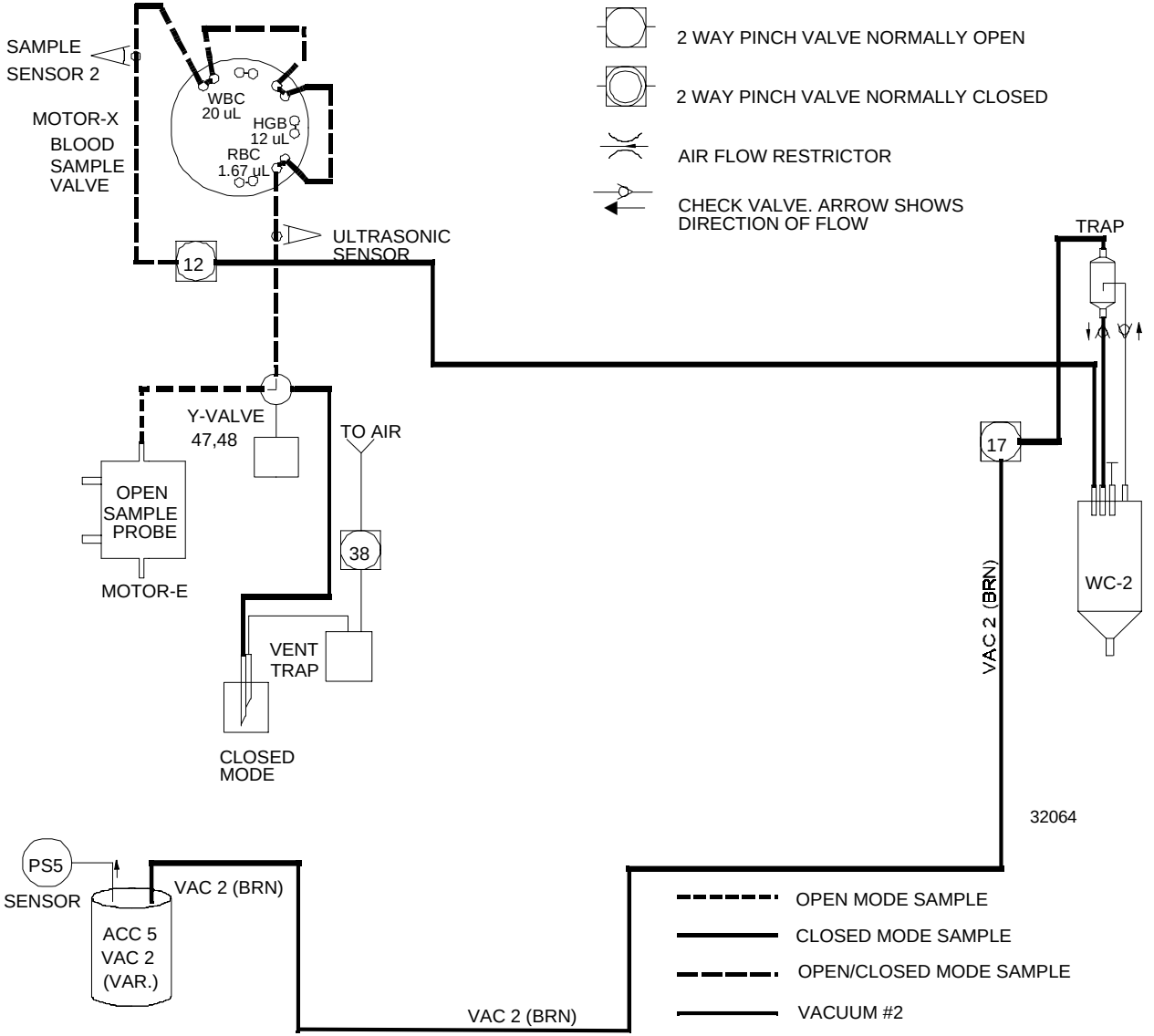


Figure 2C-6 Dilution and Mixing Flow Diagram

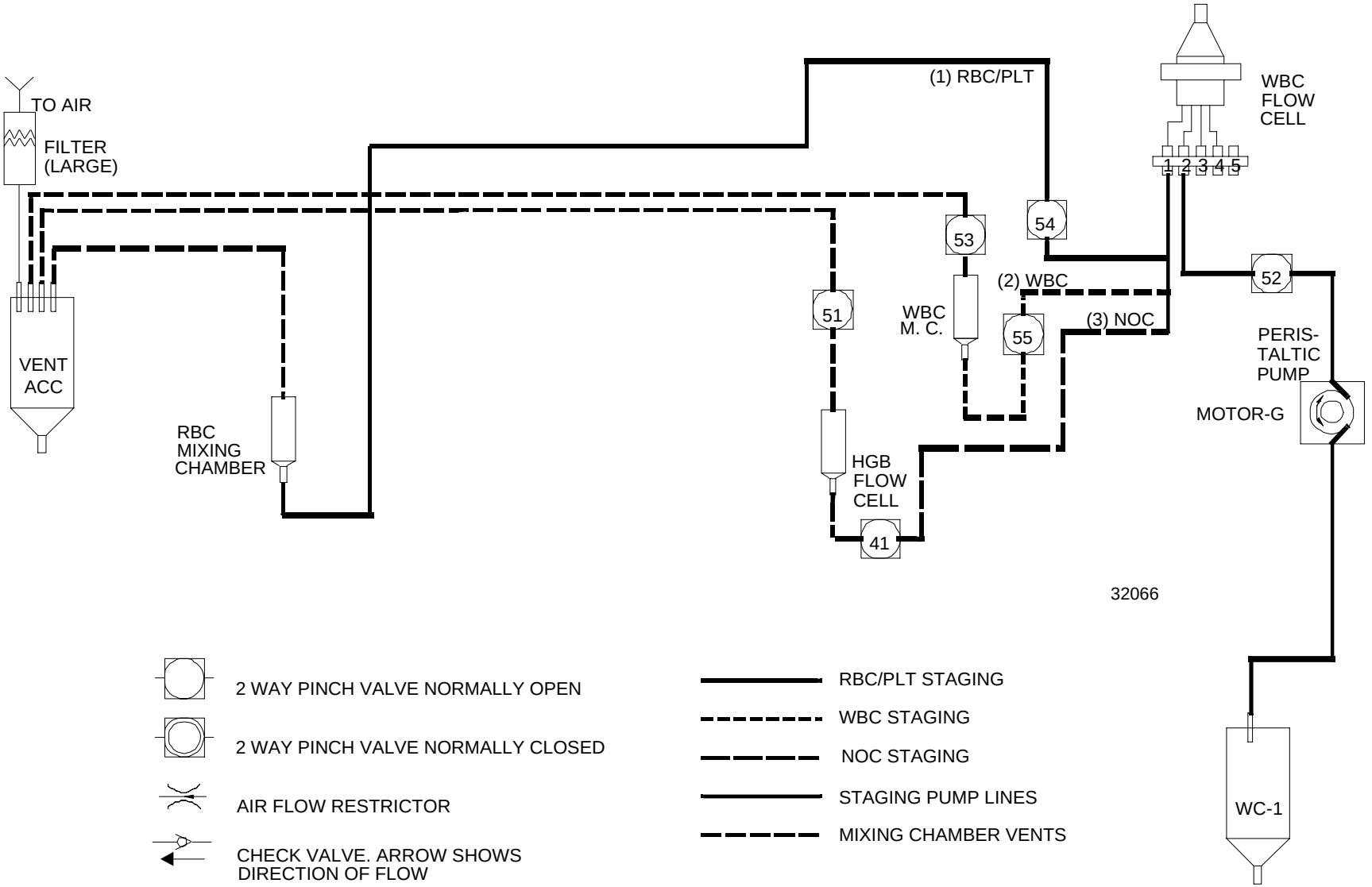


Figure 2C-7 Sample Staging Flow Diagram

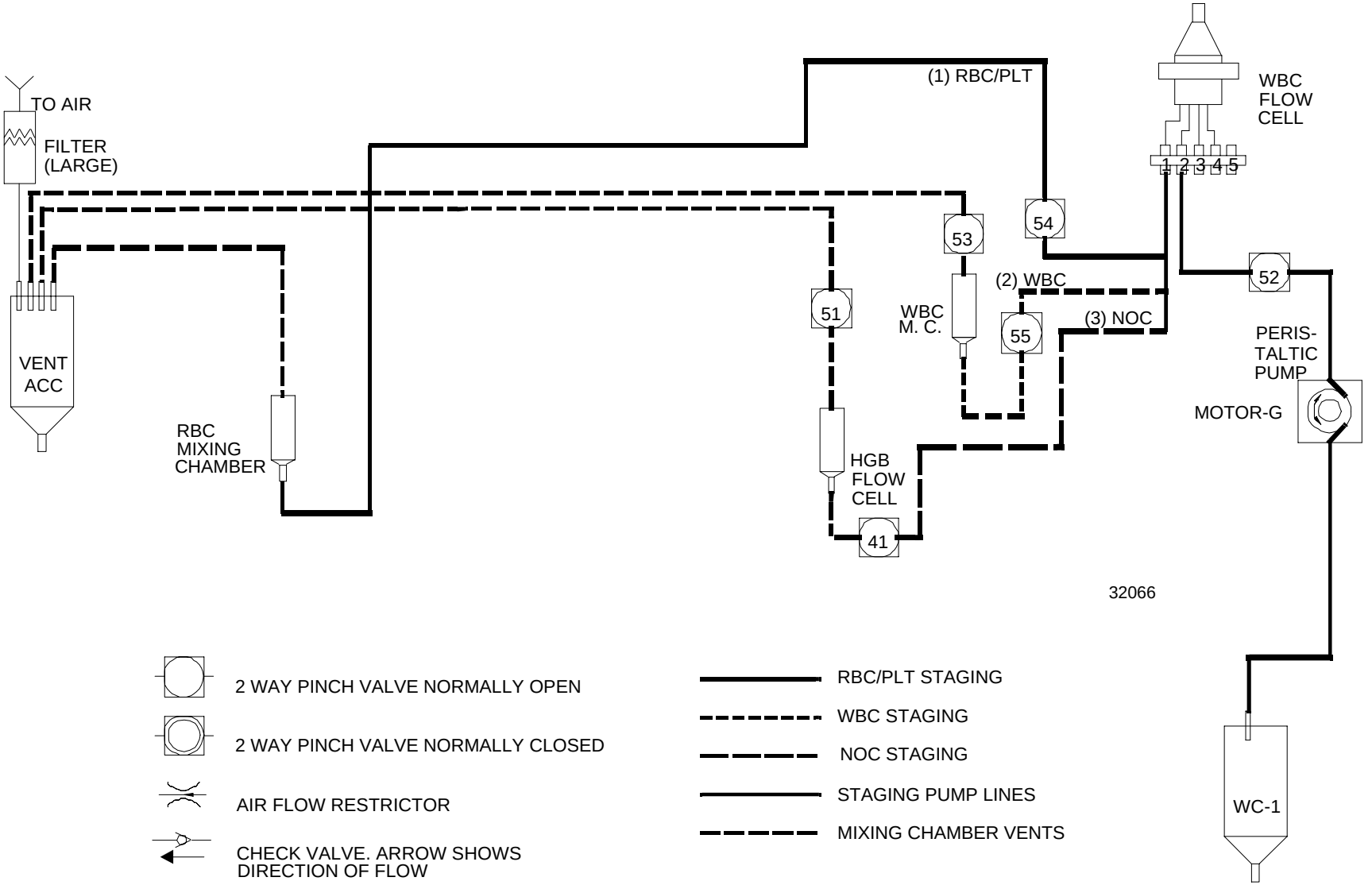


Figure 2C-8 Sample Delivery Flow Diagram

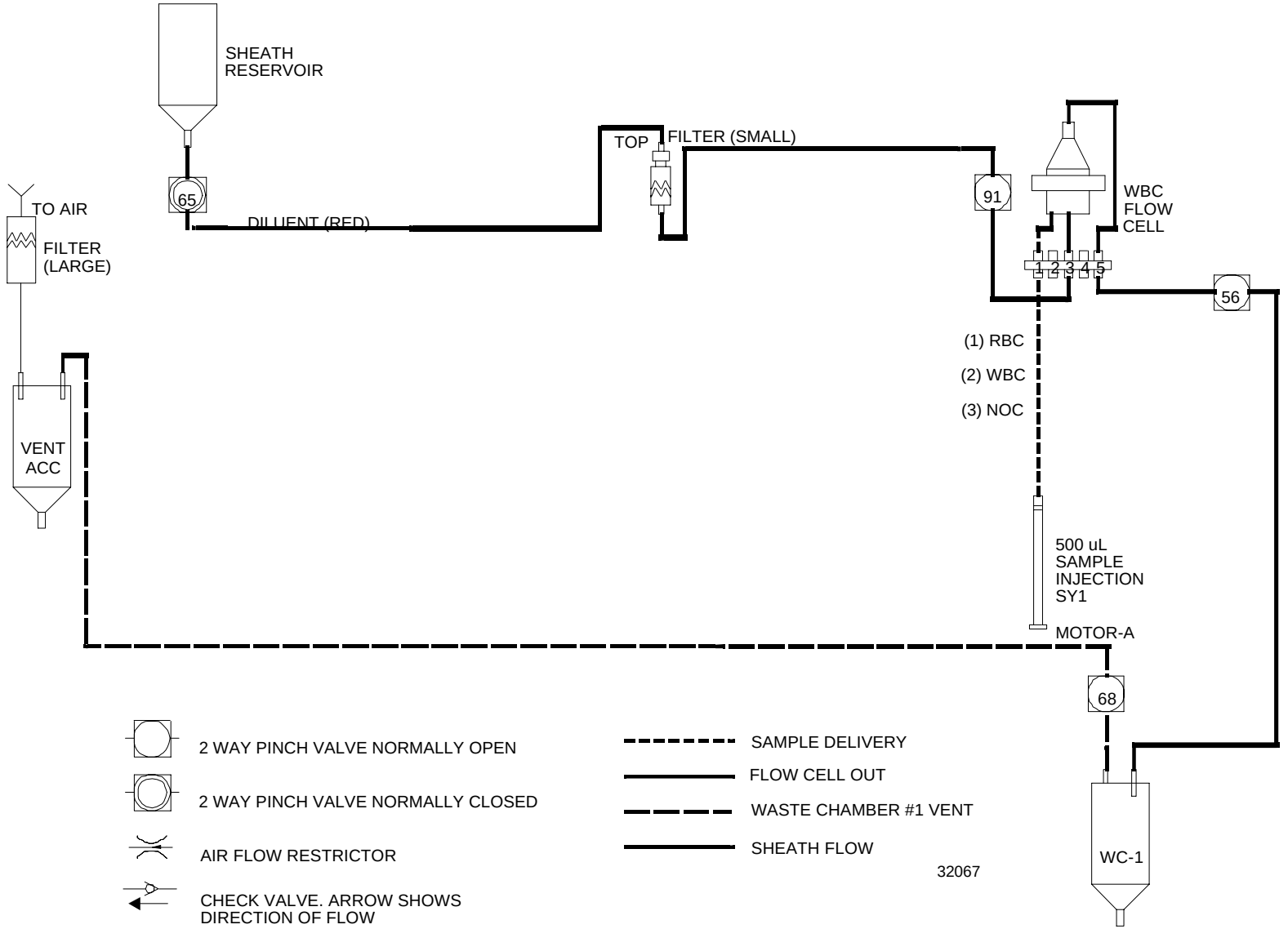


Figure 2C-9 Waste Flow Diagram

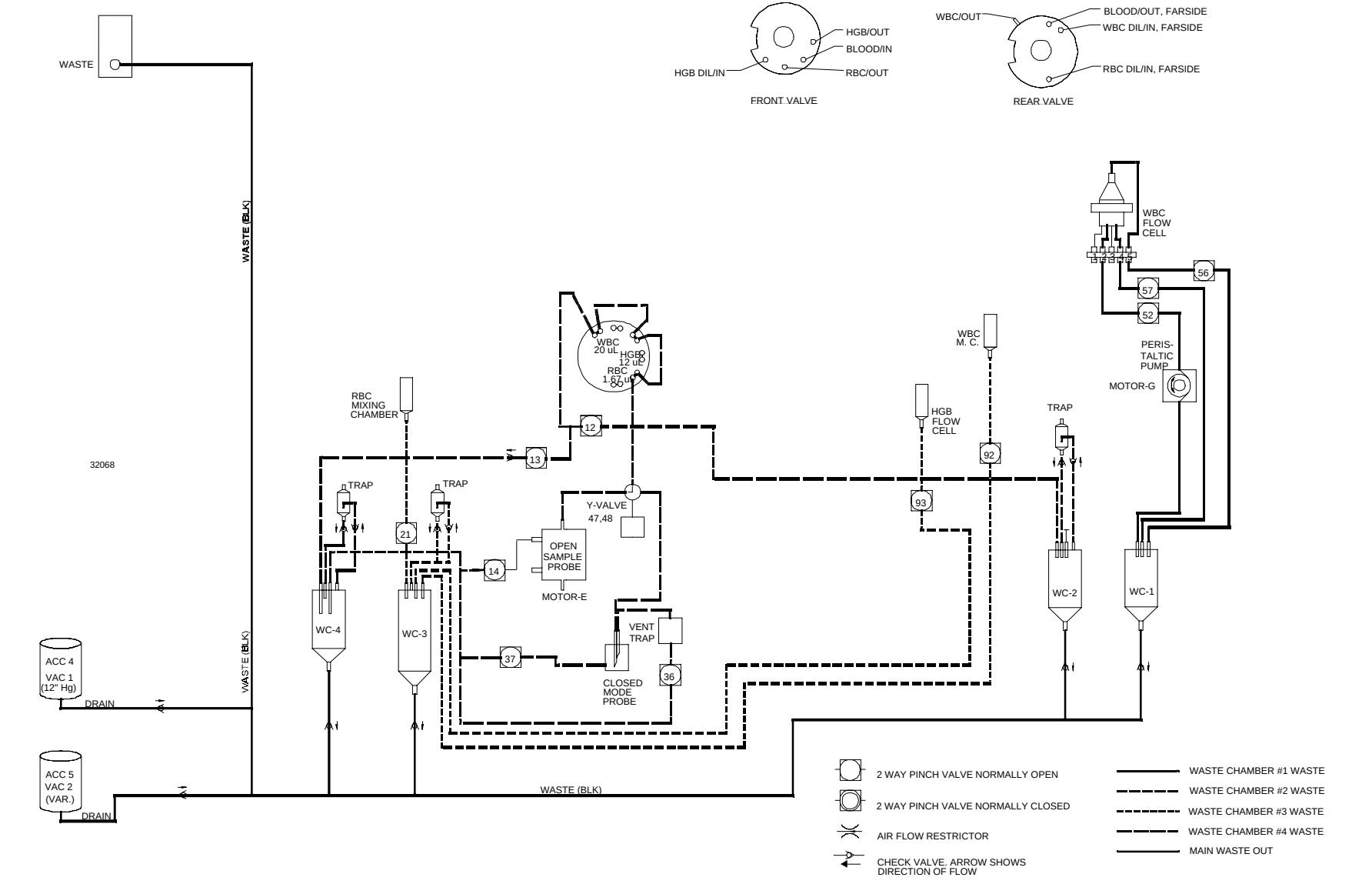
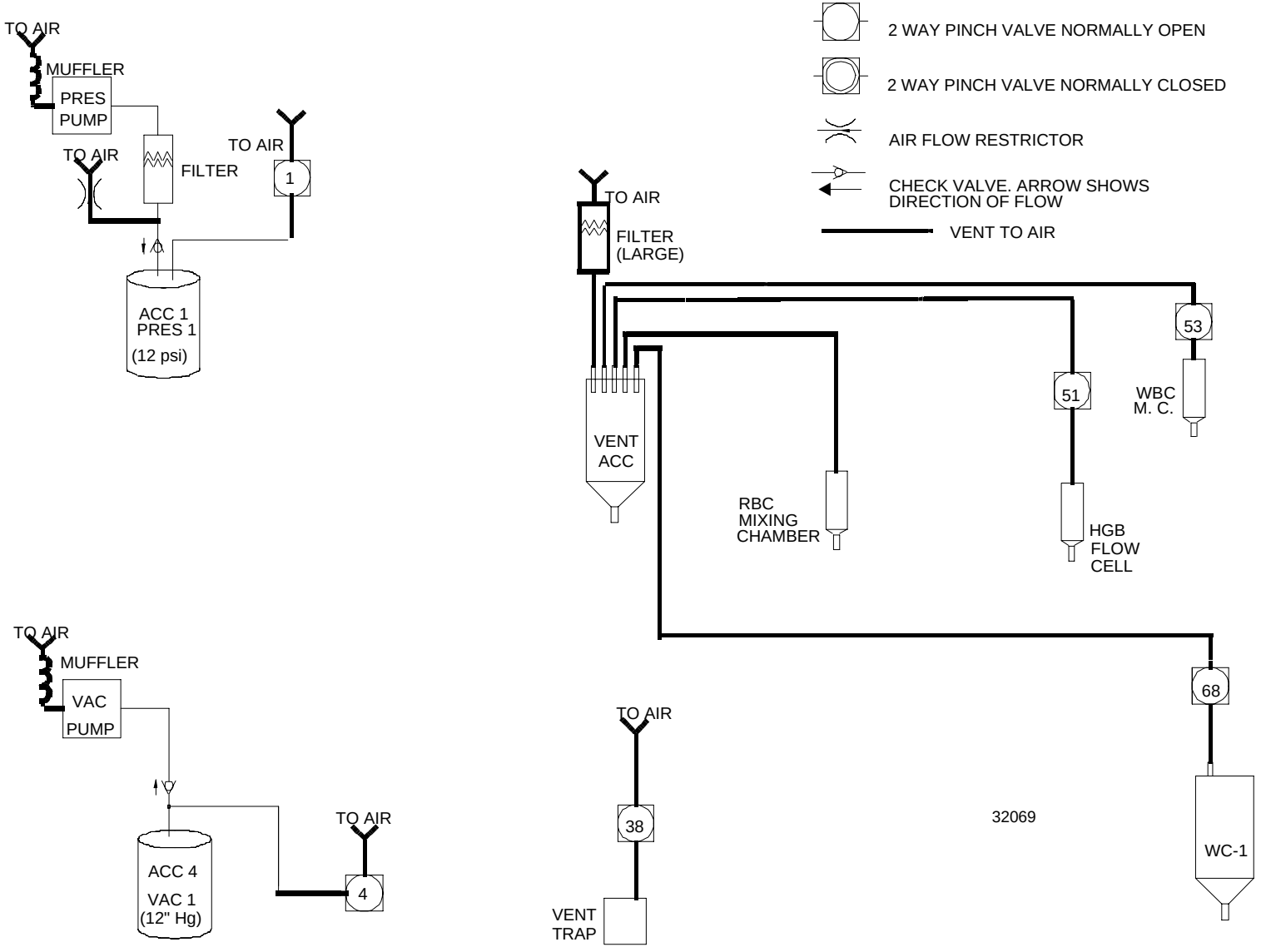


Figure 2C-10 Vent Flow Diagram



Service Commands

3200 Hidden Screens

From the Menu listed, press the function keys indicated to access the desired Service Screen.

Example: To access the Set Point Entry Screen, enter the DIAGNOSTICS Menu then press F12/F1.

From Main Menu:	F12/F8 to go to C:\CD3200 prompt
From C:\CD3200 prompt:	Type **rl** to reboot to Initialized Type **rl /nopri** to reboot to Ready (Use only if Analyzer was in the Ready Mode before entering DOS.)

DIAGNOSTICS	Pressing F12/F1 accesses the following Commands. SET POINT ENTRY LATEX/BLOOD COMPARE TOGGLE CS/SL DIAG FUNCTIONS ERROR LOG STORE RAW ON/OFF DEBUG ON/OFF Pressing DIAG FUNCTIONS accesses the following commands. PEEK COMMAND POKE COMMAND MOTOR CONTROL
CALIBRATION	F12/F1 accesses Dilution Factors

3 - Parts Lists

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How to Use This Chapter

This chapter contains Parts Identification information for the CELL-DYN 3200 System. It includes:

- Alphabetical Listing of Parts and corresponding PL numbers;
- Illustrated Parts Lists, showing part location, catalog number and description.
- System Tubing Maps with table of tubing designators, catalog numbers and descriptions.
- Table of frequently used supplies and tools.

To find information about a part:

- From the Alphabetical Listing:
  - Click on the red PL number to jump to the appropriate Parts Description/Catalog Number table.
- From an illustrated Parts List:
  - Find the part in the drawing, note its item number, and click anywhere on the drawing to jump to the appropriate Parts Description table.
- From a Tubing Map:
  - Find the Tubing Designator on the tubing, e.g., small silicon tubing is designator S1. Click anywhere on the Tubing Map to jump to the Tubing Designator/Catalog Number table.

Reagents and Supplies

Item	Part Number	Description
1	99120-01	Calibrator, CELL-DYN 3000
2	93111-01	Ctrl, CELL-DYN 3000 (2.5 mL)
3	99129-01	Ctrl, CELL-DYN 3000 (3.0 mL)
4	03H78-01	Reagent, WBC Lyse (960 mL)
5	03H79-01	Reagent, DIL/STH (20 L)
6	03H80-01	Reagent, HGB/NOC (960 mL)
7	99644-01	Enzymatic Cleaner
8	1360-02	ISE Conditioning Solutions
9	8160580701	Versalube
10	8160600301	5.0µ Standard Reference Particles
11	8160600401	7.0µ Standard Reference Particles
12	8160600501	3.0µ Standard Reference Particles
13	06H63-01	Rack, Sample Loader (1 ea)
14	04H87-01	Racks, Sample Loader (5 ea)
15	92532-01	Connector, Ser Loopback
16	06H71-01	Specifications, Interface
17	8938080601	Disks, Installation (1 & 2)
18	8938070001	Disk, Service
19	06H61-01	Disk, Setup
20	06H90-01	Kit, Software Upgrade Dom.
21	06H91-01	Kit, Software Upgrade Int.
22	8945020201	Fixture, Voltage Divider

Alphabetical Parts List Cross Reference

Description	List #
3.0µ Standard Reference Particles	Rea/Sup
5.0µ Standard Reference Particles	Rea/Sup
7.0µ Standard Reference Particles	Rea/Sup
Accumulator, Vac/Pres (Lg)	PL-5
Accumulator, Vac/Pres (SM)	PL-5
Barcode Reader	PL-18
Bd, Cable Dist Module, CDM	PL-16
Bd, Chopper Driver Module, CDB	PL-6 PL-7
Bd, CPU/DCM	PL-13
Bd, DC Motor Driver Module	PL-9
Bd, Flow Control Module, FCM	PL-14
Bd, HV/Preamp	PL-10
Bd, I/O Serial/Parallel	PL-17
Bd, In-line Sensor	PL-3
Bd, Main Amplifier Module	PL-12
Bd, w/RAM & CPU Mother	PL-17
Bd, Motor Processor Module, MPM	PL-11
Bd, PDM (Power Dist. Module)	PL-2
Bd, Photodiode Preamp	PL-10
Bd, PRM (Pump Relay Module)	PL-5
Bd, Sample Handler Module	PL-18
Bd, Sample Sensor#2	PL-9
Bd, SDM/CDM	PL-15
Bd, Sensor, Sample Tube	PL-18
Bd, SER Link/KBd Intfc	PL-17
Bd, Shear Valve Driver, SVDM	PL-9
Bd, Signal Processor Module, SPM	PL-12
Bd, Solenoid Driver Module, SDM	PL-15 PL-16
Bd, Status Alert	PL-19
Bd, Ultrasonic Sensor	PL-9
Bd, Video, VGA W/1MB RAM	PL-17
Bd, VPM (Vac/Pres Module)	PL-5
Bd. Sample Handler Module, SHM	PL-8
Belt, Timing	PL-7
Belt, Timing Spinner Assy	PL-6
Belt, Timing, GS1 Assy	PL-6
Belt, Timing, GS1 Motor	PL-6
Bench, Optics (Complete)	PL-10
Block, Wash, Closed Sample	PL-6
Block, Wash, Open Sample	PL-6
Bottle, Vent Accumulator	PL-4
Bottle, Waste (large)	PL-4
Bottle, Waste (small)	PL-4
Cable Kit, Internal I/O	PL-17
Cable, 90^0 PRE-J2 to MAM-J12	PL-10 PL-12
Cable, 90^0 D PRE-J2 to MAM-J14	PL-10 PL-12
Cable, CDM-J6 to FCM-J2	PL-16

Description	List #
Cable, CDM2-J10 to SH Sensor	PL-16
Cable, CDM2-J4 to VPM-J6	PL-16
Cable, CDM2-J7 to Ext Waste	PL-3 PL-16
Cable, CDM2-J8 to DIL Sensor	PL-16
Cable, CPU-J1 to SHM1-J16	PL-13
Cable, CPU-J10 to SPM-J5	PL-12 PL-13
Cable, CPU-J12 to SPM-J7	PL-13
Cable, CPU-J17 to SHM2-J16	PL-13
Cable, CPU-J3 to SPM-J4	PL-13
Cable, CPU-J6 to MPM-J1	PL-11 PL-13
Cable, CPU-J7 to FCM-J25	PL-13
Cable, CPU-J8 to FCM-J22	PL-13
Cable, DCM2-J3 to PSM(B)-J1	PL-16
Cable, External CPU Bus	PL-12 PL-13
Cable, FCM-J-8 to HGB F. Cell	PL-14
Cable, FCM-J1 to CDM1-J6	PL-14
Cable, MUX DAC Ctrl Bus	PL-5
Cable, FCM-J10 to DIL OP Sen	PL-14
Cable, FCM-J18 to HGB Cell	PL-4
Cable, FCM-J2 to CDM2-J6	PL-14
Cable, FCM-J21 to PDM-J8	PL-14
Cable, FCM-J22 to CPU-J8	PL-14
Cable, FCM-J23 to VPM-J13	PL-14
Cable, FCM-J24 to VPM-J14	PL-14
Cable, FCM-J25 to CPU-J7	PL-14

Description	List #
Cable, FCM-J26 to ILSB-J1	PL-14 PL-3
Cable, FCM-J4 to SDM9-J10	PL-14
Cable, FCM-J5 to PSM(B)-J1	PL-14
Cable, FCM-J7 to SAB-J1	PL-14 PL-19
Cable, FCM-J8 to SVDM-J2	PL-14
Cable, FCM-J9 to Start SW	PL-14
Cable, Floppy Drive INTFC	PL-17
Cable, Hard Drive INTFC	PL-17
Cable, HGB Flow Cell to FCM	PL-4
Cable, HSSL (Internal)	PL-13
Cable, HSSL to Monitor	PL-17
Cable, Interface, HSSL	PL-17
Cable, MAM-J10 to PD PRE	PL-12
Cable, MAM-J12 to PD PRE	PL-12
Cable, MAM-J15 to SPM-J6	PL-12
Cable, MAM-J3 to PDM-J4	PL-12
Cable, MAM-J4 to CPU-J9	PL-12 PL-13
Cable, MDM-J1 to SDM4-J8	PL-9
Cable, MDM-J2 to SDM4-J7	PL-9
Cable, MPM-J3 to CDB A-J1	PL-7 PL-11
Cable, MPM-J4 to CDB B-J1	PL-7 PL-11
Cable, MPM-J5 to CDB C-J1	PL-7 PL-11
Cable, MPM-J6 to CDB D-J1	PL-7 PL-11
Cable, MPM-J7 to CDB E-J1	PL-11
Cable, MPM-J7 to CDM-J1	PL-6

Description	List #
Cable, MPM-J9 to CDB G-J1	PL-8 PL-11
Cable, MUX DAC CTRL Bus	PL-12 PL-13 PL-14
Cable, Nose Cover Sensor	PL-8 PL-19
Cable, P/O Ultrasonic Sen	PL-14
Cable, PDM-J10 to Hard Drive	PL-2 PL-17
Cable, PDM-J11 to Floppy Drive	PL-2 PL-17
Cable, PDM-J12 to SHM1-J12	PL-2
Cable, PDM-J13 to SHM2-J12	PL-2
Cable, PDM-J2/J3 to Mother Bd.	PL-2 PL-17
Cable, PDM-J4 to MAM-J3	PL-2 PL-13
Cable, PDM-J5 to MDM-J3	PL-2 PL-9
Cable, PDM-J6 to MPM-J2	PL-2 PL-11
Cable, PDM-J8 to FCM-J21	PL-2 PL-5
Cable, PMT Socket	PL-10
Cable, Printer, Parallel	PL-17
Cable, PSM (B)-J1 to CDM2-J3	PL-1
Cable, PSM (B)-J3 to SVD-J3	PL-1
Cable, PSM (B)-J4 to PDM-J9	PL-1 PL-2
Cable, PSM (Back)-J2 to CDM1-J3	PL-1 PL-15
Cable, PSM (T)-J13 to PWR SW	PL-1
Cable, PSM (T)-J2 to PRM-J4	PL-1
Cable, PSM (T)-J501 to PDM-J1	PL-1 PL-2
Cable, PSM (T)-J7 to XXXFAN	PL-1
Cable, PSM (T)-J8 to XXXFAN	PL-1

Description	List #
Cable, SDM Data/+5V Bus	PL-14 PL-15 PL-16
Cable, SDM5-J10 to CDM2-J1	PL-16
Cable, SDM5-J10 to CDM2-J2	PL-16
Cable, SDM9-J10 to FCM-J4	PL-16
Cable, Serial Periph Bus	PL-5 PL-13 PL-14
Cable, SHM1-J1 to GS2 Solenoid	PL-8
Cable, SHM1-J12 to PDM-J12	PL-8
Cable, SHM1-J13 to GS1 Motor	PL-8
Cable, SHM1-J16 to CPU-J1	PL-8
Cable, SHM1-J8 to Spin Motor	PL-8
Cable, SHM1-J9 to Sensors	PL-8
Cable, SHM2-J10 to MIX Sens	PL-18
Cable, SHM2-J11 to Tube Sens	PL-18
Cable, SHM2-J12 to PDM-J13	PL-18
Cable, SHM2-J13 to MIX MTR	PL-18
Cable, SHM2-J15 to BCD RDR	PL-18
Cable, SHM2-J16 to CPU-J17	PL-18
Cable, SHM2-J9 to RACK Sens	PL-18
Cable, SPM-J4 to CPU-J3	PL-12
Cable, SS2-J1 to FCM-J14	PL-9 PL-14
Cable, SVDM J3 to PSM (B)-J3	PL-9
Cable, SVDM J4 to DC Motor	PL-9
Cable, SVDM-J1 to Sensors	PL-9

Description	List #
Cable, SVDM-J2 to FCM-J8	PL-9
Cable, Vac1 Wet Sensor	PL-5
Cable, Vac2 Wet Sensor	PL-5
Cable, VPM-J13 to FCM-J23	PL-5
Cable, VPM-J14 to FCM-J24	PL-5
Cable, VPM-J18 to PRM-J1	PL-5
Cable, VPM-J6 to CDM2-J4	PL-5
Cable, Waste Full Sensor	PL-3
Cable, Y-Valve Sensor	PL-8 PL-9
Calibrator, CELL-DYN 3000	Rea/Sup
Cap Assy, Diluent/Sheath	PL-3
Cap Assy, HGB/NOC Lyse	PL-3
Cap Assy, WBC, Lyse	PL-3
Cbl, SDM/CDM-J1 to SDM1-J10	PL-15
Cbl, SDM/CDM-J2 to SDM2-J10	PL-15
Chamber, Mixing, RBC/WBC	PL-4
Clamp, Tubing 1/4 O.D.	TM
Computer Assy, CD3200	PL-17
Connector, Ser Loopback	Rea/Sup
Cord, Power 125Vac 10A	PL-1
Cover, Front Nose Section	PL-19
Cover, Keyboard	PL-17
Cover, Left Front Door	PL-19
Cover, Left Side	PL-19
Cover, Right Front Door	PL-19

Description	List #
Cover, Right Side	PL-19
Cover, SL Bottom	PL-19
Cover, SL Left Side Front	PL-19
Cover, SL Right Side Front	PL-19
Cover, SL Top Skirt	PL-19
Cover, Top	PL-19
Cylinder, Air, Mixer Lift	PL-18
Cylinder, Air, X & Y Index	PL-18
Disk Drive, Floppy, 1.44MB	PL-17
Disk Drive, Hard, 540MB	PL-17
Disk, Service	Rea/Sup
Disk, Setup	Rea/Sup
Disks, Installation (1 & 2)	Rea/Sup
Driver Assy, Y-Valve, Complete	PL-8
Enzymatic Cleaner	Rea/Sup
Fan Guards & Filter, 3 Pcs	PL-3
Fan, 115VAC, 4.69” SQ	PL-3
Filter, 5 Micron, In-line	TM
Filter, In-line, Sheath	PL-4
Filter, Pressure Pump	PL-5
Filter, Vent Accumulator	PL-4
Fitting, Luer Lock	PL-7
Fitting, Reagent Inlet	PL-3
Fitting, Waste Outlet	PL-3
Fixture, Voltage Divider	Rea/Sup

Description	List #
Flow Cell Assy, HGB	PL-4
Flow Cell, Optical	PL-10
Fitting (T4)	TM
Fitting 0.062” X 0.062” X 0.062”	TM
Fitting Barb Conn 0.062" X 0.062"	TM
Fitting Barb RDCR 0.093" X 0.062"	TM
Fitting Barb RDCR 0.125" X 0.062"	TM
Fitting Barb RDCR 0.125" X 0.093"	TM
Fitting Conn 0.093 X 0.093	TM
Fitting Elb 0.062" X 0.062" X 0.062"	TM
Fitting Elb 0.093 X 0.093	TM
Fitting, L, 1/8 in x 1/8 in	TM
Fitting, Reducer, 3/16 in to 1/8 in	TM
Fitting RSTR .010” X 1/16”	TM
Fitting RSTR .016” X 1/16”	TM
Fitting T 0.062" X 0.062" X 0.062"	TM
Fitting T 0.062" X 0.125" X 0.062"	TM
Fitting T 0.093 X 0.093 X 0.093	TM
Fitting T 0.125" X 0.125" X 0.125"	TM
Fuse, 4A 220/240 (≥200VAC In)	PL-1
Fuse, 5A 220/240 Vac	PL-5
Fuse, 8A 220/240 (<200VAC In)	PL-1
Fuse, Fast 1A 250V 3 AG	PL-2
Fuse, SB 15A 220/240VAC	PL-1
ISE Cleaning Solutions	Rea/Sup

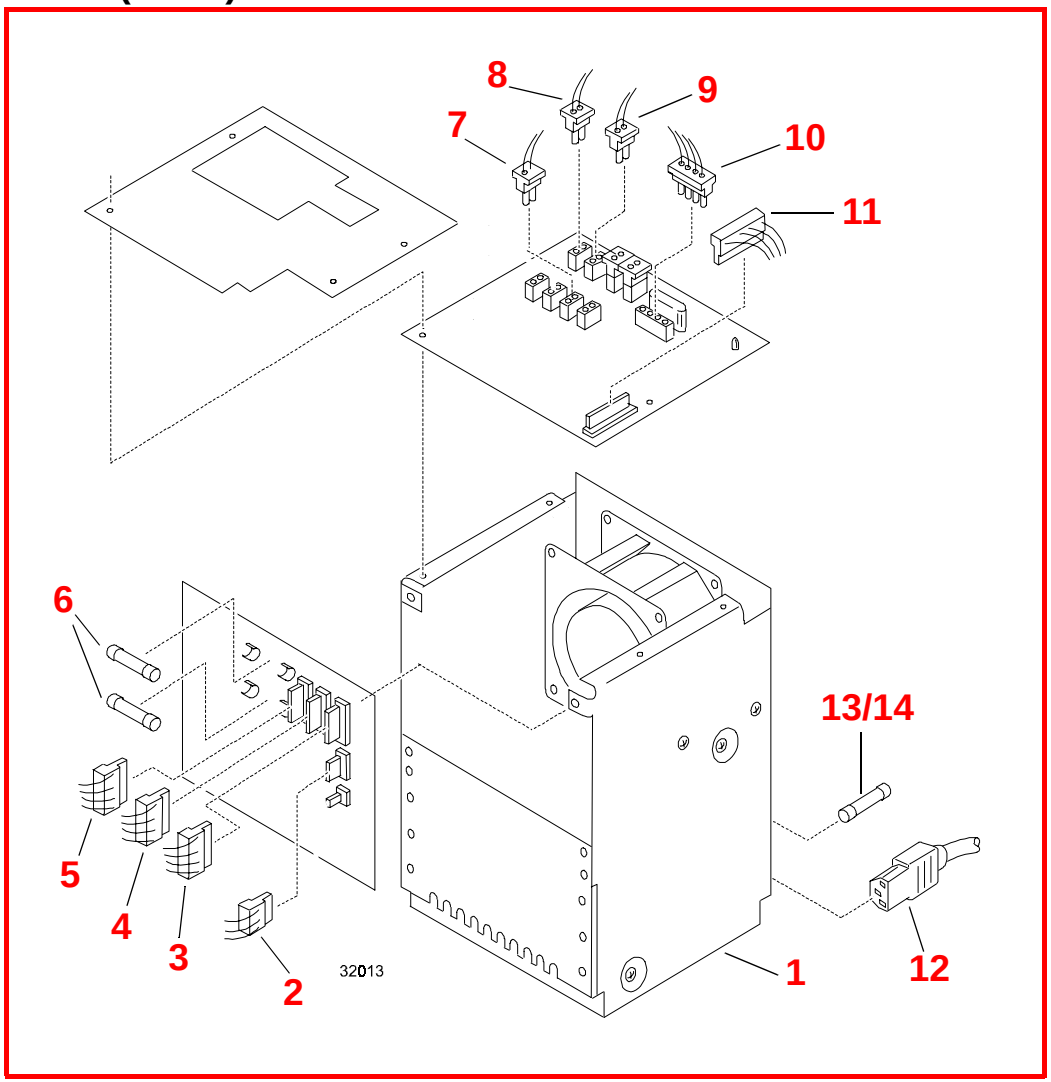
Description	List #
Keyboard, PCAT	PL-17
Kit, Hardware, 3200	PL-4 PL-5 PL-19
Kit, Reagent Line (Complete)	PL-3
Kit, Software Upgrade Dom.	Rea/Sup
Kit, Software Upgrade Int.	Rea/Sup
Knob, Sample Valve	PL-9
Laser, HeNe, 5mw	PL-10
Mirror Perforated	PL-10
Mixer Head, Complete	PL-18
Monitor, 14” VGA Color	PL-17
Motor, Spinner Assy	PL-6
Motor, Stepper	PL-6 PL-7 PL- 8
Motor, Stepper, GS1	PL-6
Motor, Stepper, Mixer	PL-18
Motor, Y-Valve	PL-8
Needle, Closed Sample	PL-6
Plug	TM
Power Supply Laser	PL-2
Power Supply, AC/DC Main	PL-1
Probe Driver Assy, Open	PL-6
Probe, Open Sample	PL-6
Pump Assy, Peristaltic	PL-8
Pump Head, Vac/Pres	PL-5

Description	List #
Pump Roller Assy	PL-8
Pump, Pressure (Complete)	PL-5
Pump, Vacuum (Complete)	PL-5
Rack, Sample Loader (1 ea)	Rea/Sup
Racks, Sample Loader (5 ea)	Rea/Sup
Reagent, DIL/STH (20 L)	Rea/Sup
Reagent, HGB/NOC (960 mL)	Rea/Sup
Reagent, WBC Lyse (960 mL)	Rea/Sup
Regulator, Pressure	PL-18
Reservoir, Diluent/Sheath	PL-4
Sample Loader, Complete	PL-18
Sensor, Overpressure	PL-4
Sensor, Photodiode & LED	PL-6 PL-8 PL-18 PL-19
Sensor, Sample Detector	PL-9
Sensor, Sample, Ultrasonic	PL-8
Shear Valve Driver Assy	PL-9
Shield, SHM #1, 2	PL-18
Smpl Valve Ceramic, Center	PL-9
Smpl Valve Ceramic, Front	PL-9
Smpl Valve Ceramic, Rear	PL-9
Solenoid, GS2 Stop	PL-6
Speaker Assy	PL-17
Specifications, Interface	Rea/Sup
Switch, AC Input, 16A	PL-17

Description	List #
Switch, Reed, w/Cable	PL-18
Switch, Touch Bar	PL-19
Syringe Driver Assy, (AB)	PL-7
Syringe, Diluent (10 mL)	PL-7
Syringe, Driver Assy, (CD)	PL-7
Syringe, Sample Inject, 500 uL	PL-7
Syringe, WBC/HGB (2.5 mL)	PL-7
Tubing Silicon (S2)	TM
Tubing Silicon (SY)	TM
Tubing Silicon 1/32 ID x 5/32 OD	TM
Tubing Tyg 0.062" ID 0.125" OD Pur	TM
Tubing Tyg 0.062" ID 0.125" OD Red	TM
Tubing Tyg 0.062”	TM
Tubing Tyg 0.125 ID 0.250 OD Grn	TM
Tubing Tyg 0.125 “ID 0.250” OD Yel	TM
Tubing Tyg 0.125" ID 0.250" 0D Pur	TM
Tubing Tyg 0.125" ID 0.250" OD Blk	TM
Tubing Tyg 0.125" ID 0.250" OD Grn	TM
Tubing Tyg 0.125" ID 0.250" OD Or	TM
Tubing Tyg 0.125" ID 0.250" OD Red	TM
Tubing Tyg 0.125” ID 0.250 OD Blu	TM
Tubing Tyg 1/32” ID 3/32 OD	TM
Tubing Tyg 3/16” ID 5/16” OD Clr	TM
Tubing Tyg 3/32”	TM
Tubing Tyg O.125” ID 0.250” OD Gry	TM

Description	List #
Tubing Tygon®, 1/16” ID	TM
Tubing Tygon®, 1/8” ID	TM
Tower Assy, Aspiration	PL-6
Trap Assy, Waste Bottle	PL-4
Tube Assy, Waste Outlet	PL-3
Tube, Photomult, 90^0	PL-10
Tube, Photomult, 90^0 DEP	PL-10
Tubing, Peristaltic Pump	PL-8
Valve Assy, Solenoid, 3.9KG	PL-4
Valve Assy, Solenoid, 3.9KG	PL-5
Valve Assy, Solenoid, 5Kg	PL-5
Valve Assy, Solenoid, NC	PL-4
Valve, Check, Duckbill	TM
Valve, Rotary, 3-Port	PL-8
Valve, Solenoid, 3-Way	PL-18
Versalube™	Rea/Sup

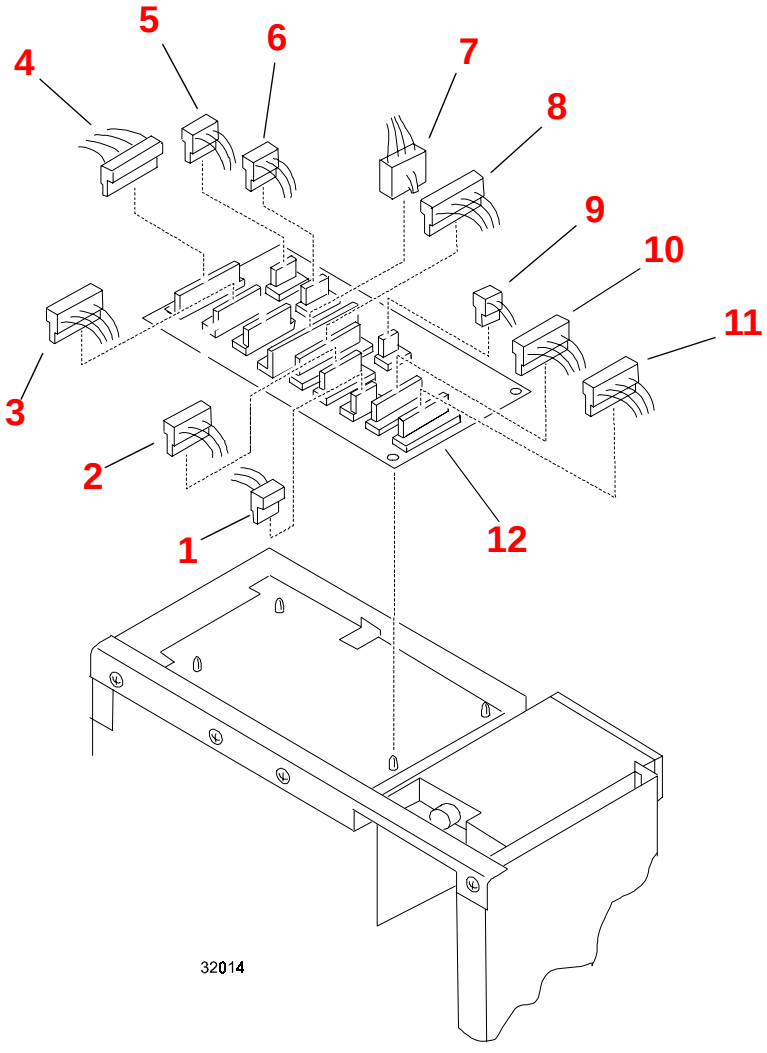
PL-1 Power Supply Module (1 of 2)



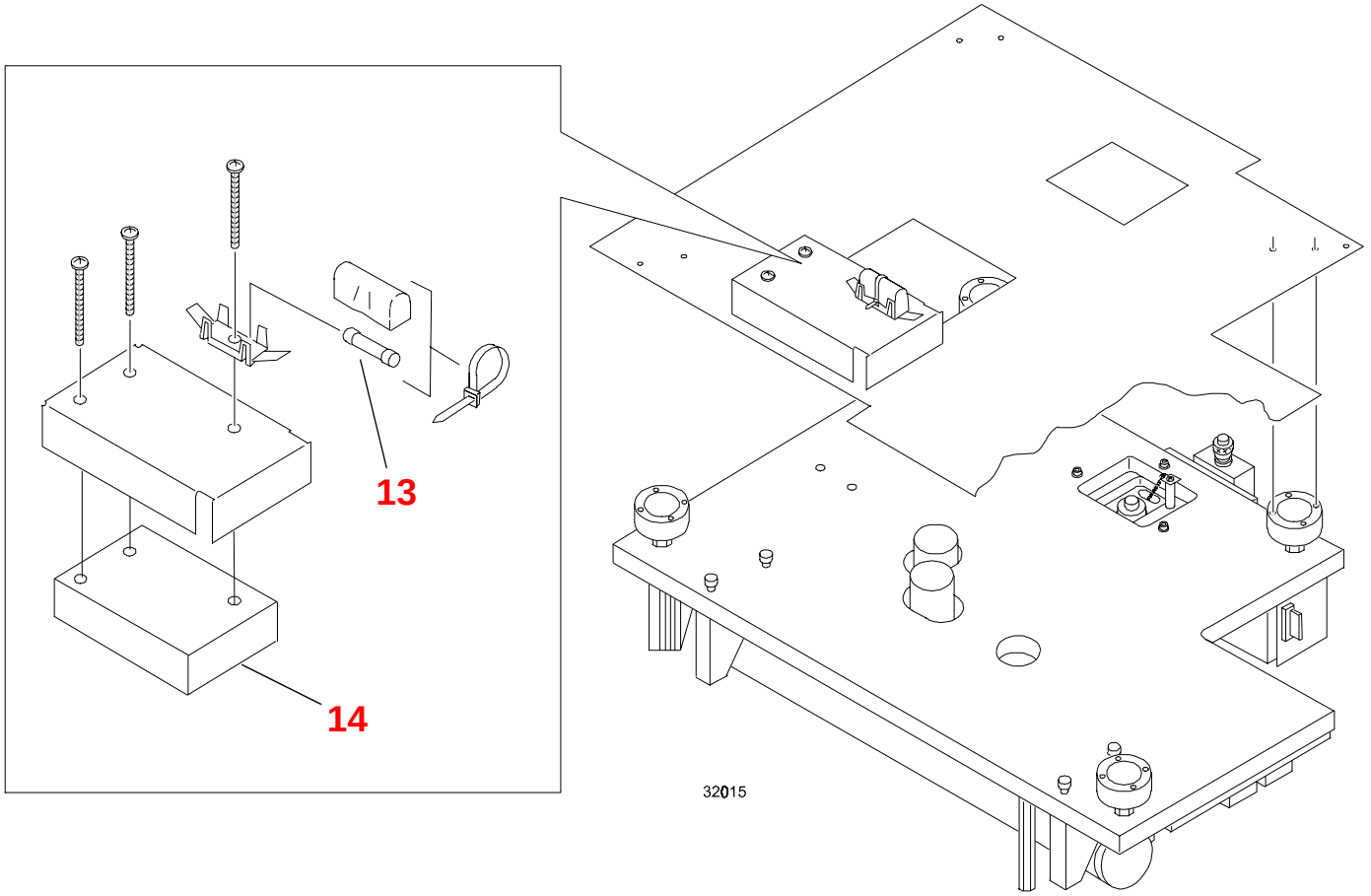
PL-1 Power Supply Module (2 of 2)

Item	Part Number	Description
1	8934000801	Power Supply, AC/DC Main
2	8951078201	Cable, PSM (B)-J4 to PDM-J9
3	8952086901	Cable, PSM (B)-J3 to SVD-J3
4	8952082801	Cable, PSM (Back)-J2 to CDM1-J3
5	8952086601	Cable, PSM (B)-J1 to CDM2-J3
6	8510016601	Fuse, SB 15A 220/240VAC
7	8952087801	Cable, PSM (T)-J2 to PRM-J4
8	8952062001	Cable, PSM (T)-J8 to XXXFAN
9	8952000101	Cable, PSM (T)-J7 to XXXFAN
10	8952000201	Cable, PSM (T)-J13 to PWR SW
11	8952089601	Cable, PSM (T)-J501 to PDM-J1
12	8240051601	Cord, Power 125Vac 10A
13	50065-01	Fuse, 8A 220/240 (<200VAC In)
14	61164-01	Fuse, 4A 220/240 (≥200VAC In)

PL-2 Power Distribution Module & Laser Supply (1 of 3)



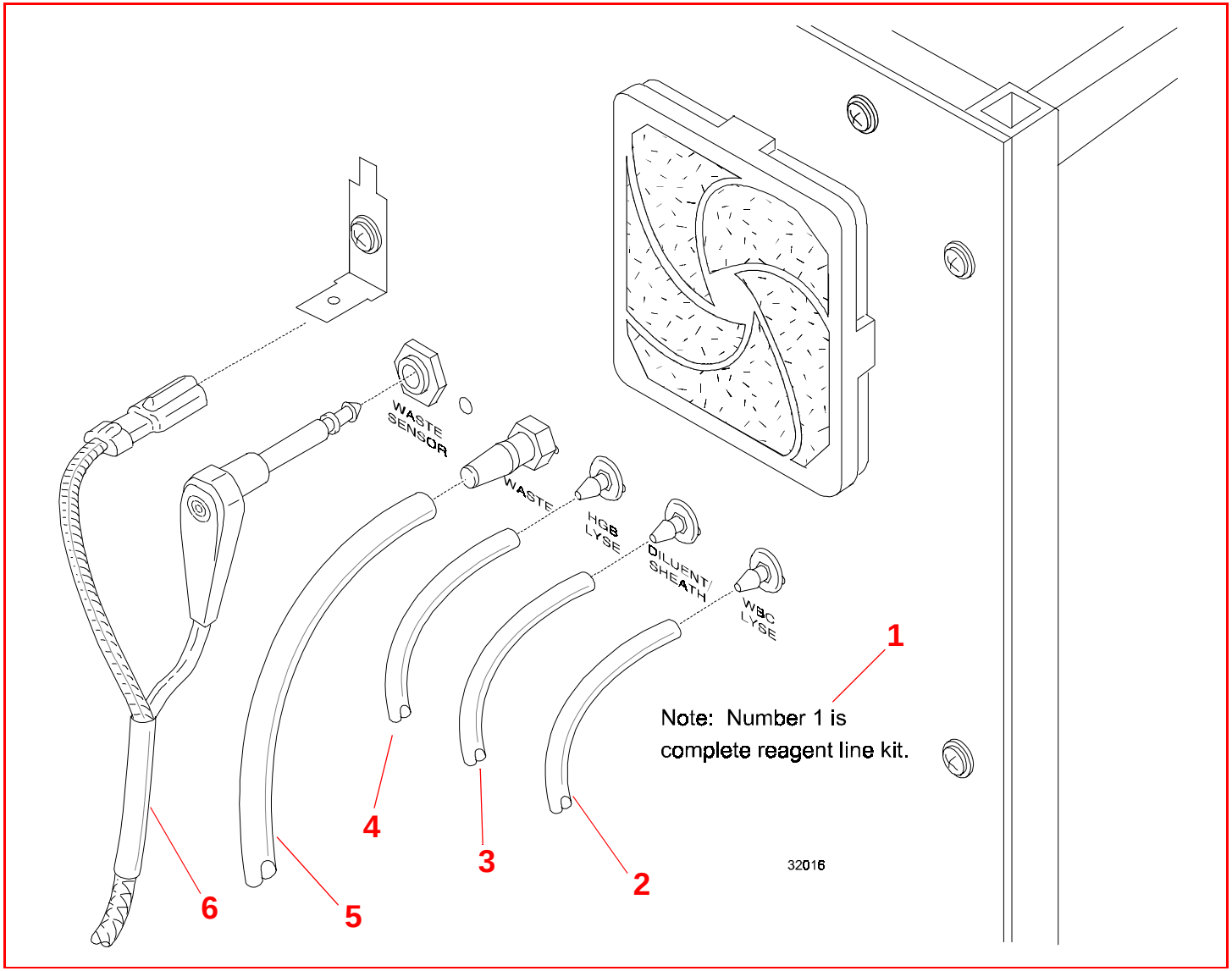
PL-2 Power Distribution Module & Laser Supply (2 of 3)



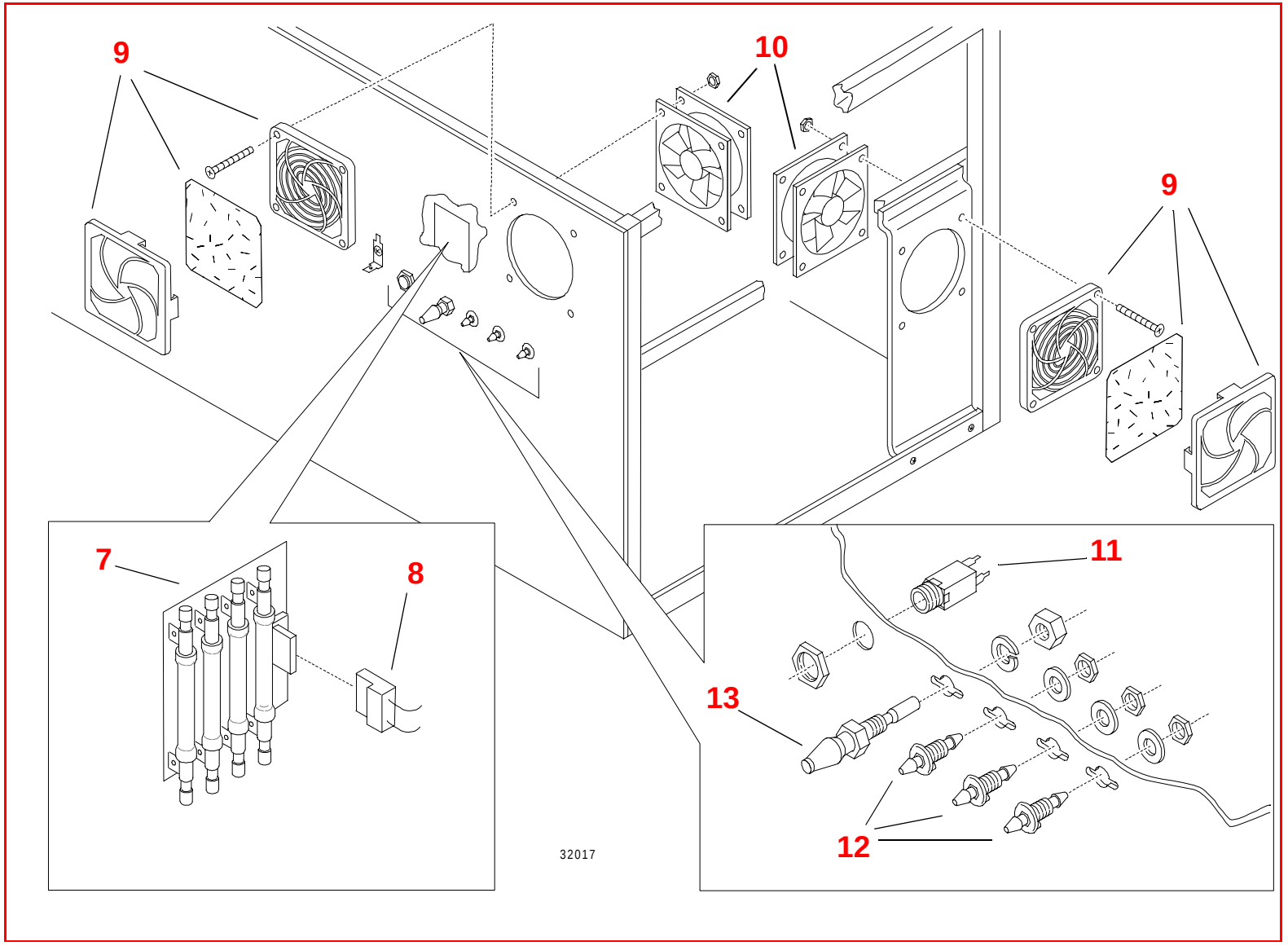
PL-2 Power Distribution Module & Laser Supply (3 of 3)

Item	Part Number	Description
1	8952078201	Cable, PSM (B)-J4 to PDM-J9
2	8952082901	Cable, PDM-J8 to FCM-J21
3	8952054301	Cable, PDM-J6 to MPM-J2
4	8952089601	Cable, PSM (T)-J501 to PDM-J1
5	8952089701	Cable, PDM-J10 to Hard Drive
6	8952089801	Cable, PDM-J11 to Floppy Drive
7	8952061201	Cable, PDM-J3 to Mother Bd.
8	8952086501	Cable, PDM-J4 to MAM-J3
9	8952078901	Cable, PDM-J5 to MDM-J3
10	8952089401	Cable, PDM-J12 to SHM1-J12
11	8952089501	Cable, PDM-J13 to SHM2-J12
12	8960198001	Bd, PDM (Power Dist. Module)
13	8510019201	Fuse, Fast 1A 250V 3 AG
14	8921207601	Power Supply Laser

PL-3 Reagent Lines & Fans (1 of 3)



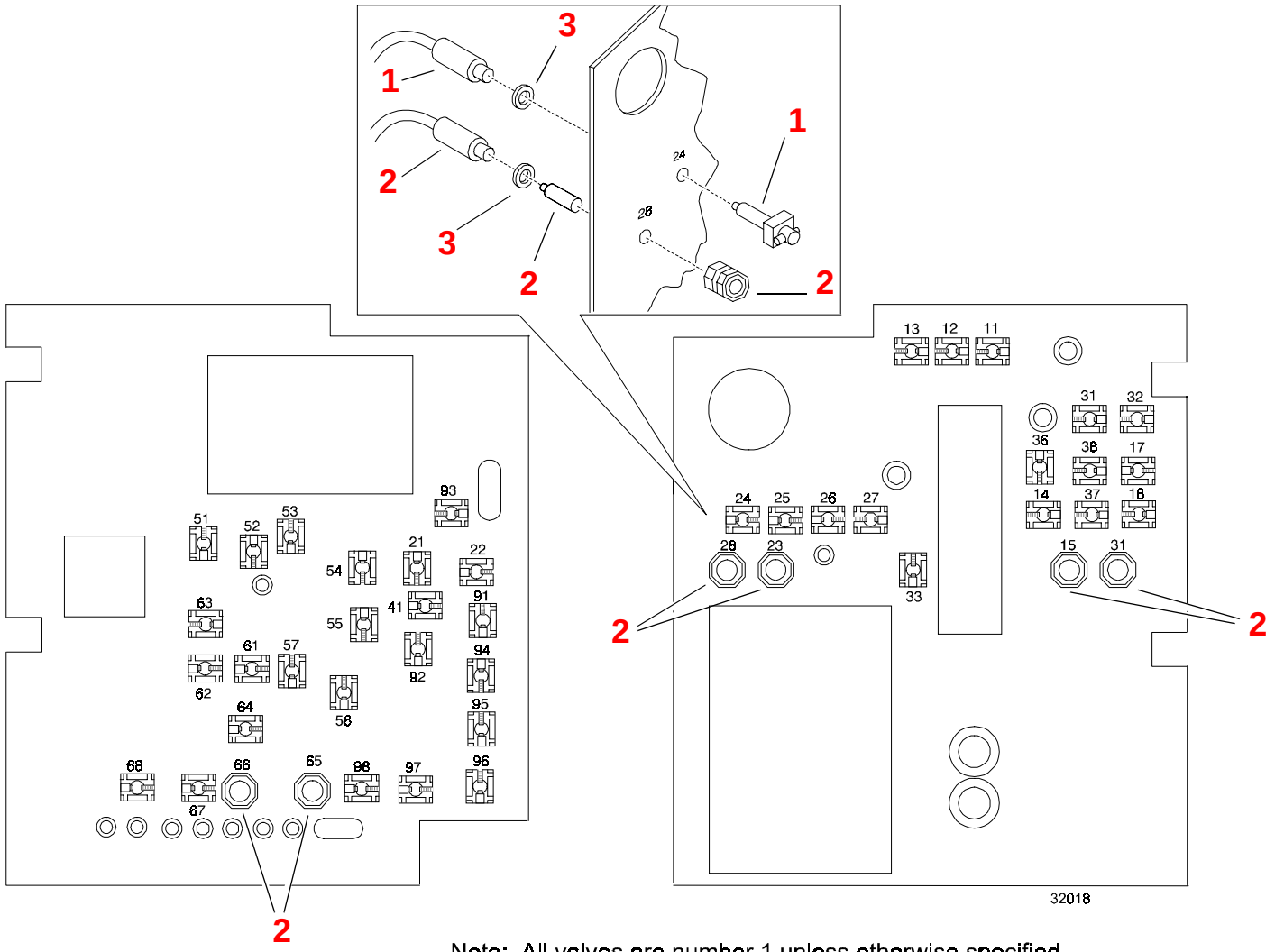
PL-3 Reagent Lines & Fans (2 of 3)



PL-3 Reagent Lines & Fans (3 of 3)

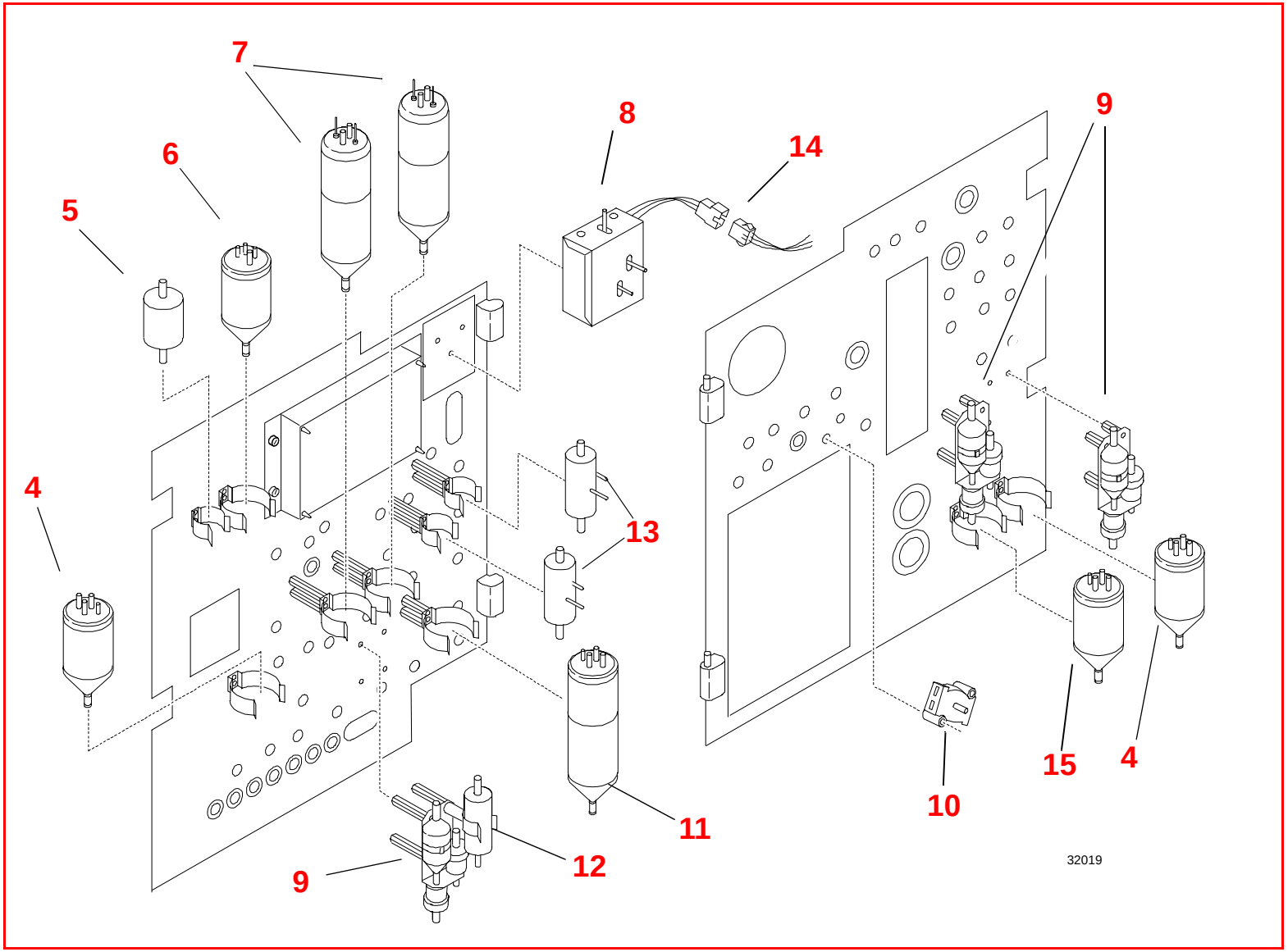
Item	Part Number	Description
1	06H65-01	Kit, Reagent Line (Complete)
2	8921210101	Cap Assy, WBC, Lyse
3	8921205901	Cap Assy, Diluent/Sheath
4	8921211501	Cap Assy, HGB/NOC Lyse
5	92161-02	Tube Assy, Waste Outlet
6	8925089901	Cable, Waste Full Sensor
7	8960091001	Bd, In-line Sensor
8	8952087001	Cable, FCM-J26 to ILSB-J1
9	03484-01	Fan Guards & Filter, 3 Pcs
10	8260402701	Fan, 115VAC, 4.69” SQ
11	8952085701	Cable, CDM2-J7 to Ext Waste
12	8930038301	Fitting, Reagent Inlet
13	8930067601	Fitting, Waste Outlet

PL-4 Flow Panel (1 of 3)



Note: All valves are number 1 unless otherwise specified.

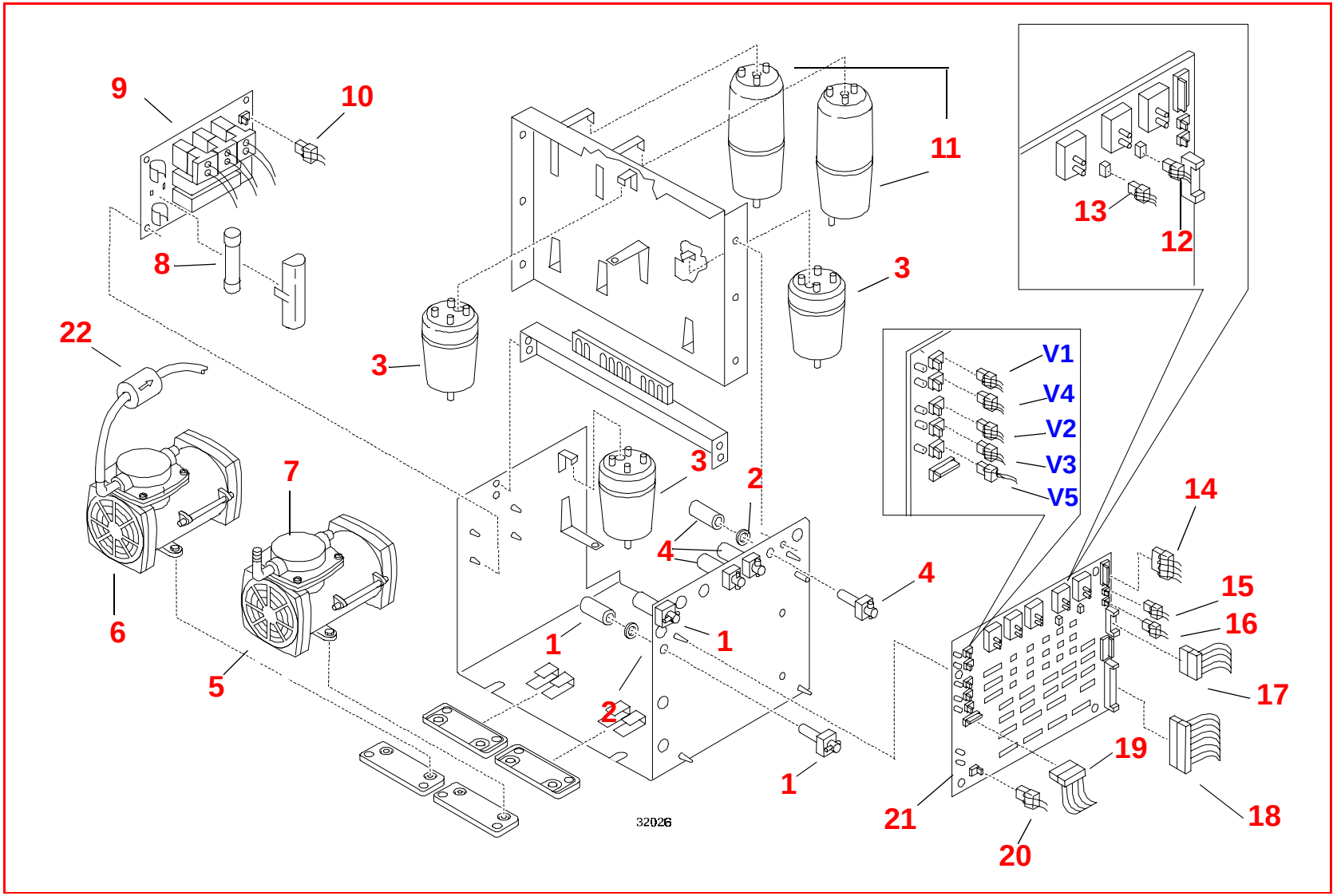
PL-4 Flow Panel (2 of 3)



PL-4 Flow Panel (3 of 3)

Item	Part Number	Description
1	8921122501	Valve Assy, Solenoid, 3.9KG
2	8921016301	Valve Assy, Solenoid, NC
3	8913007601	Kit, Hardware, 3200
4	8921174702	Bottle, Waste (small)
5	8270721901	Filter, Vent Accumulator
6	8921176502	Bottle, Vent Accumulator
7	8921174902	Reservoir, Diluent/Sheath
8	8921206702	Flow Cell Assy, HGB
9	8921150901	Trap Assy, Waste Bottle
10	8510615001	Sensor, Overpressure
11	8921174802	Bottle, Waste (large)
12	8270721901	Filter, In-line, Sheath
13	8921210801	Chamber, Mixing, RBC/WBC
14	8952077801	Cable, HGB Flow Cell to FCM
15	8921217201	Bottle, Waste (small w/tubing)

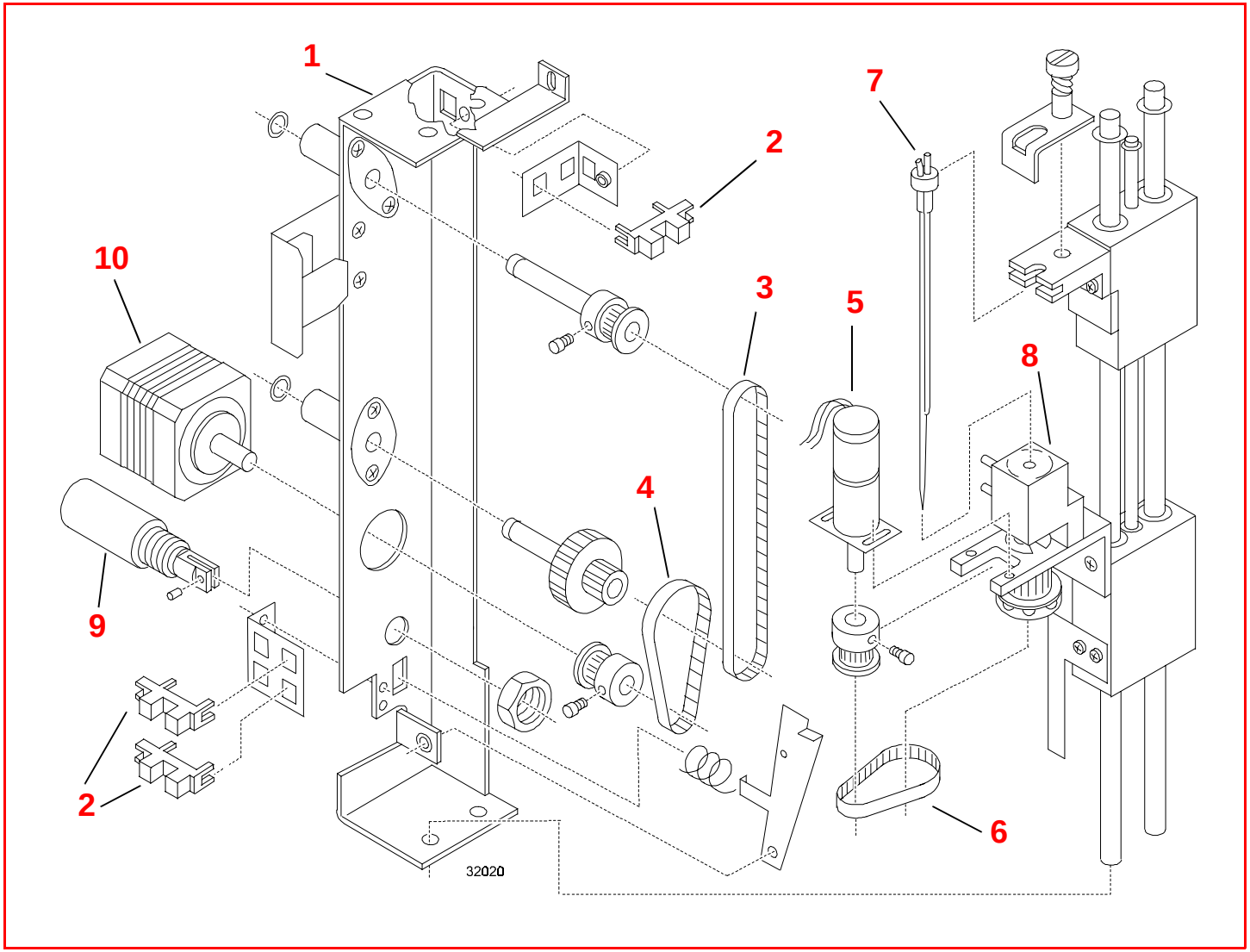
PL-5 Vacuum/Pressure (1 of 2)



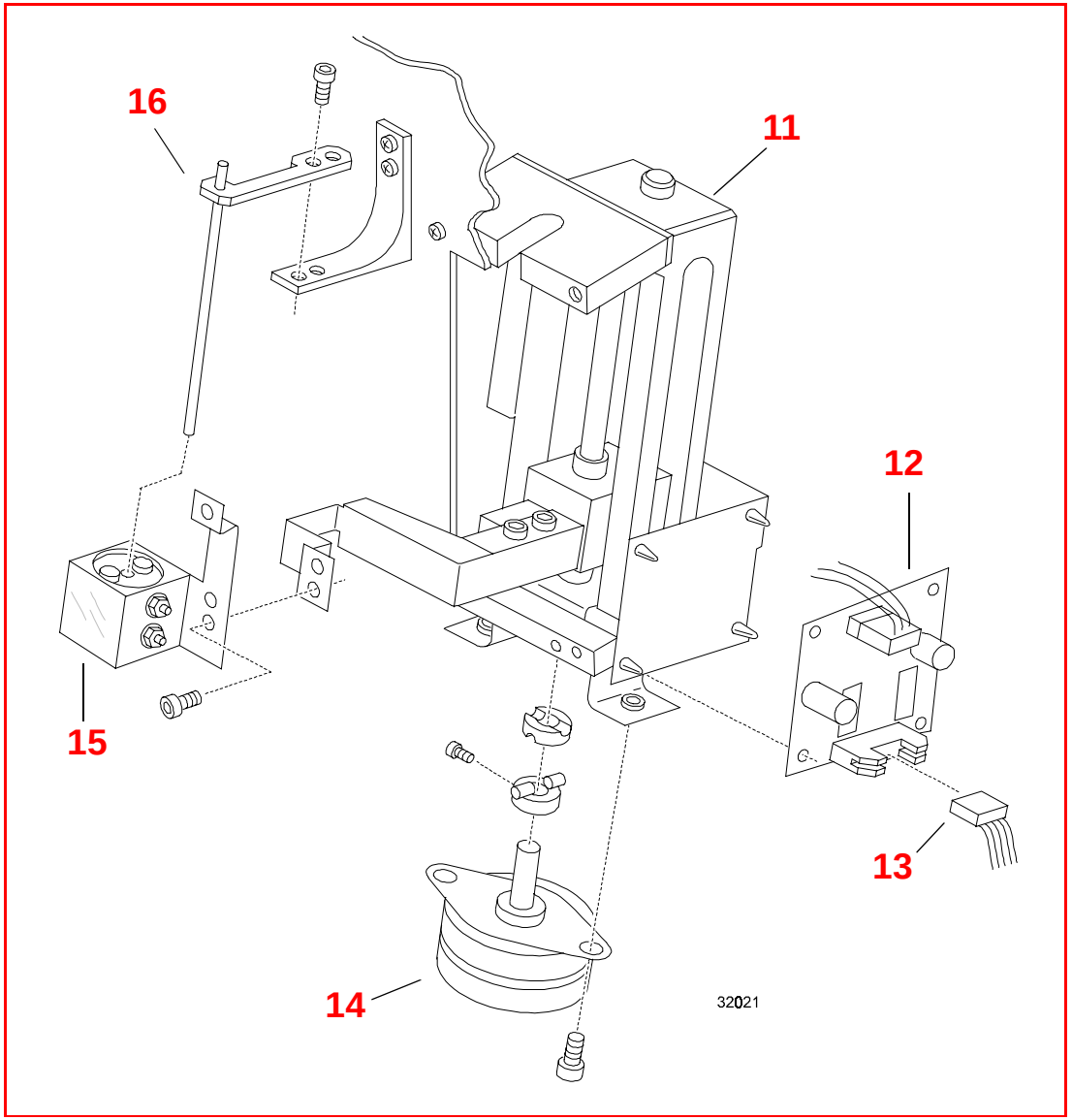
PL 5 Vacuum/Pressure (2 of 2)

Item	Part #	Description
1	8921122001	Valve Assy, Solenoid, 5Kg
2	8913007601	Kit, Hardware, 3200
3	8921173201	Accumulator, Vac/Pres (SM)
4	8921122101	Valve Assy, Solenoid, 3.9KG
5	8921153401	Pump, Vacuum (Complete)
6	8921153001	Pump, Pressure (Complete)
7	8410301801	Pump Head, Vac
8	60160-01	Fuse, 5A 220/240 Vac
9	8960120001	Bd, PRM (Pump Relay Module)
10	8952083401	Cable, VPM-J18 to PRM-J1
11	8921173401	Accumulator, Vac/Pres (Lg)
12	8952087501	Cable, Vac2 Wet Sensor
13	8952052801	Cable, Vac1 Wet Sensor
14	8952082901	Cable, PDM-J8 to FCM-J21/VPM-J12
15	8952083101	Cable, VPM-J13 to FCM-J23
16	8952083201	Cable, VPM-J14 to FCM-J24
17	8952084101	Cable, MUX DAC CTRL Bus
18	8952084901	Cable, Serial Periph Bus
19	8952087901	Cable, VPM-J6 to CDM2-J4
20	8952083401	Cable, VPM-J18 to PRM-J1
21	8960122001	Bd, VPM (Vac/Pres Module)
22	8270040301	Filter, Pressure Pump

PL-6 Aspiration Tower & Open Probe Assemblies (1 of 3)



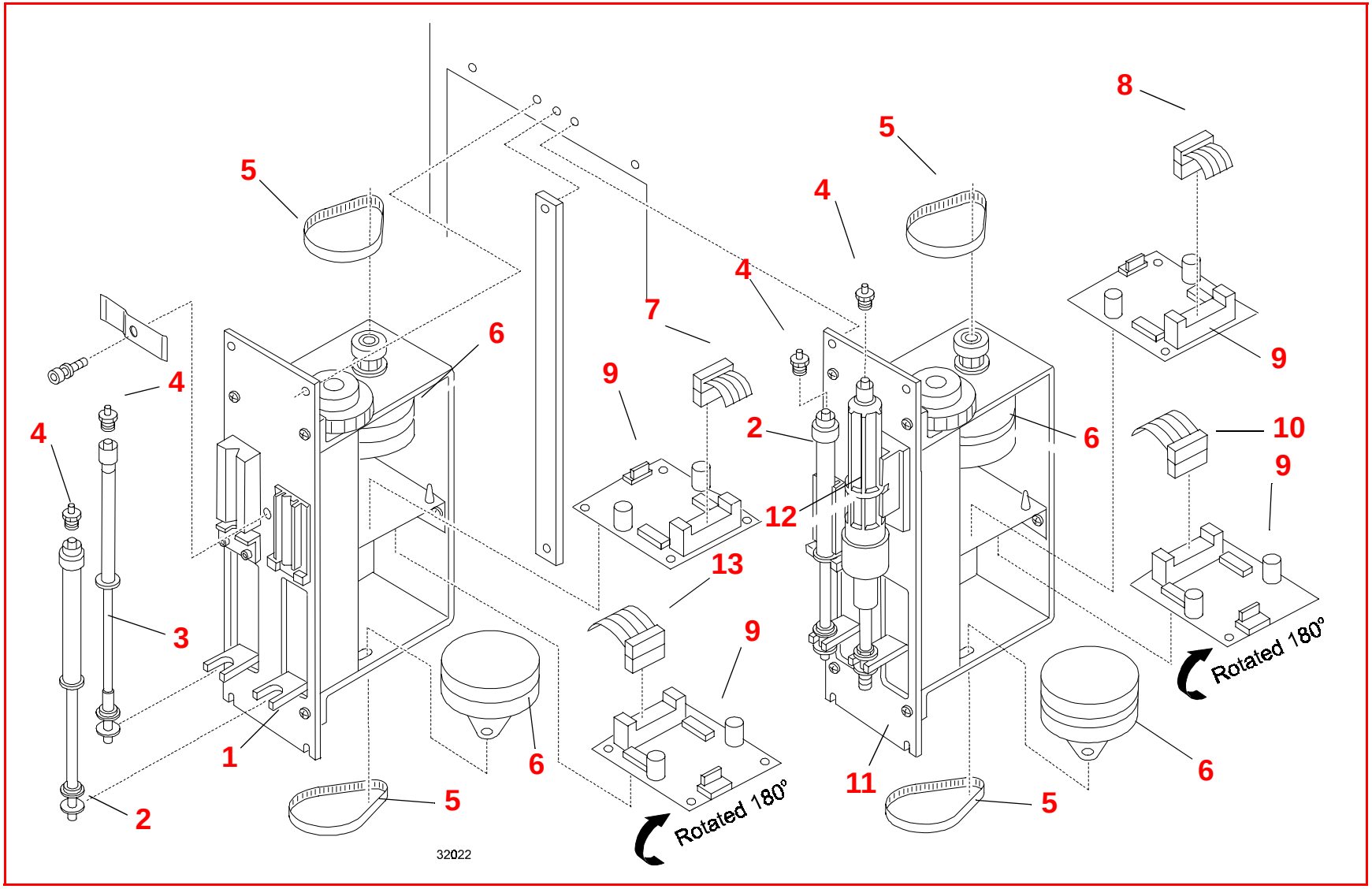
PL-6 Aspiration Tower & Open Probe Assemblies (2 of 3)



PL-6 Aspiration Tower & Open Probe Assemblies (3 of 3)

Item	Part #	Description
1	8921208502	Tower Assy, Aspiration
2	8370830101	Sensor, Photodiode & LED
3	8250426601	Belt, Timing, GS1 Assy
4	8250426501	Belt, Timing, GS1 Motor
5	8921209202	Motor, Spinner Assy
6	8250426801	Belt, Timing Spinner Assy
7	03H99-01	Needle, Closed Sample
8	8933040501	Block, Wash, Closed Smple
9	8934005801	Solenoid, GS2 Stop
10	8350602701	Motor, Stepper, GS1
11	8921204601	Probe Driver Assy, Open
12	9960042001	Bd, Chopper Driver Module, CDB
13	8952084201	Cable, MPM-J7 to CDM-J1
14	8921076101	Motor, Stepper
15	8931201401	Block, Wash, Open Sample
16	8930094601	Probe, Open Sample

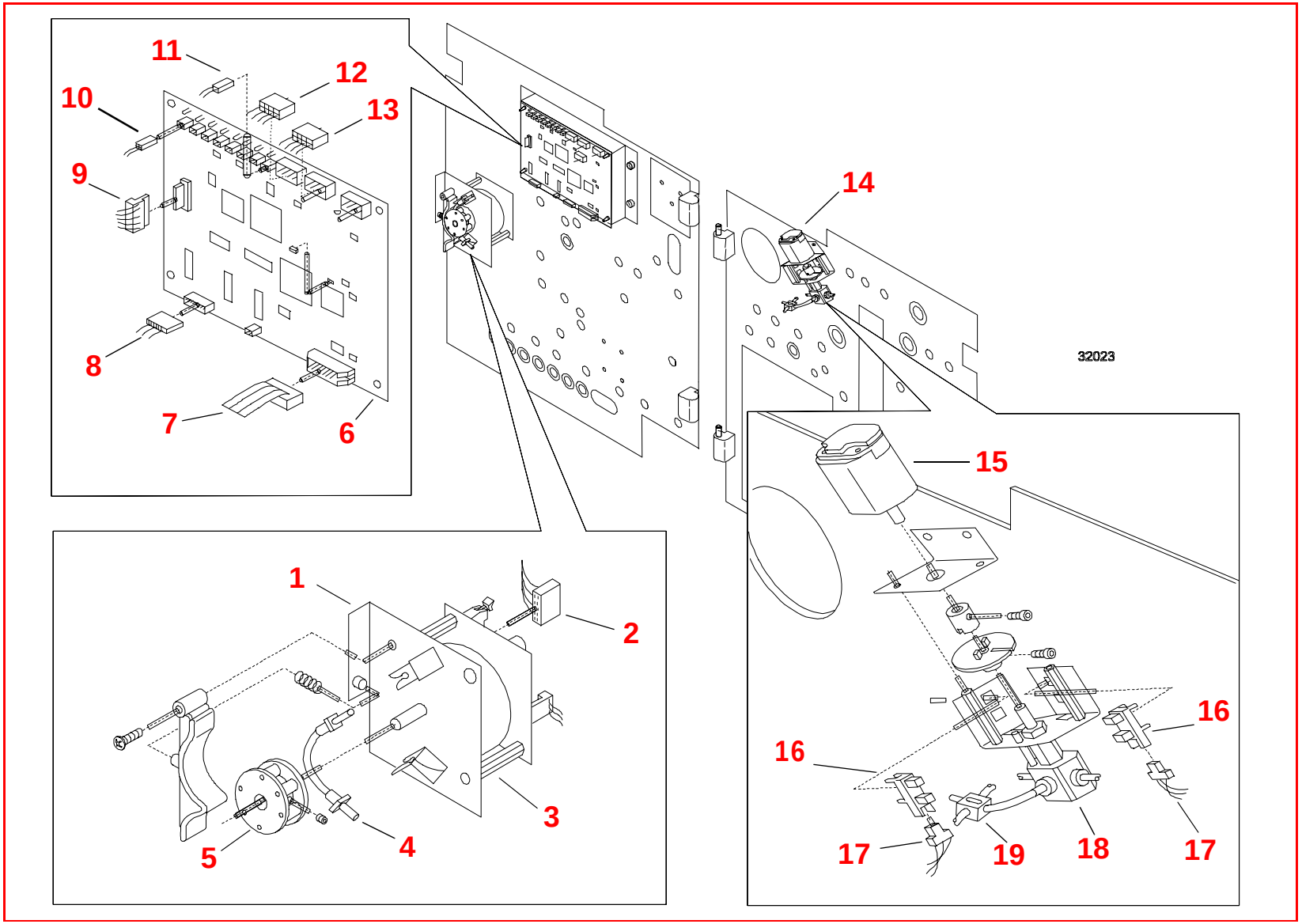
PL-7 Syringe Drivers (AB, CD) (1 of 2)



PL-7 Syringe Drivers (AB, CD) (2 of 2)

Item	Part #	Description
1	8921217301	Syringe Driver Assy, (AB)
2	28561-01	Syringe, WBC/HGB (2.5 mL)
3	28560-01	Syringe, Sample Inj (500 uL)
4	04H02-01	Fitting, Luer Lock
5	8250425701	Belt, Timing
6	8921076101	Motor, Stepper
7	8952084401	Cable, MPM-J4 to CDB-J1
8	8952015401	Cable, MPM-J6 to CDB D-J1
9	8960042001	Bd, Chopper Driver Module, CDB
10	8952015501	Cable, MPM-J5 to CDB C-J1
11	8921217401	Syringe, Driver Assy, (CD)
12	02H82-01	Syringe, Diluent (10 mL)
13	8952084501	Cable, MPM-J3 to CDB A-J1

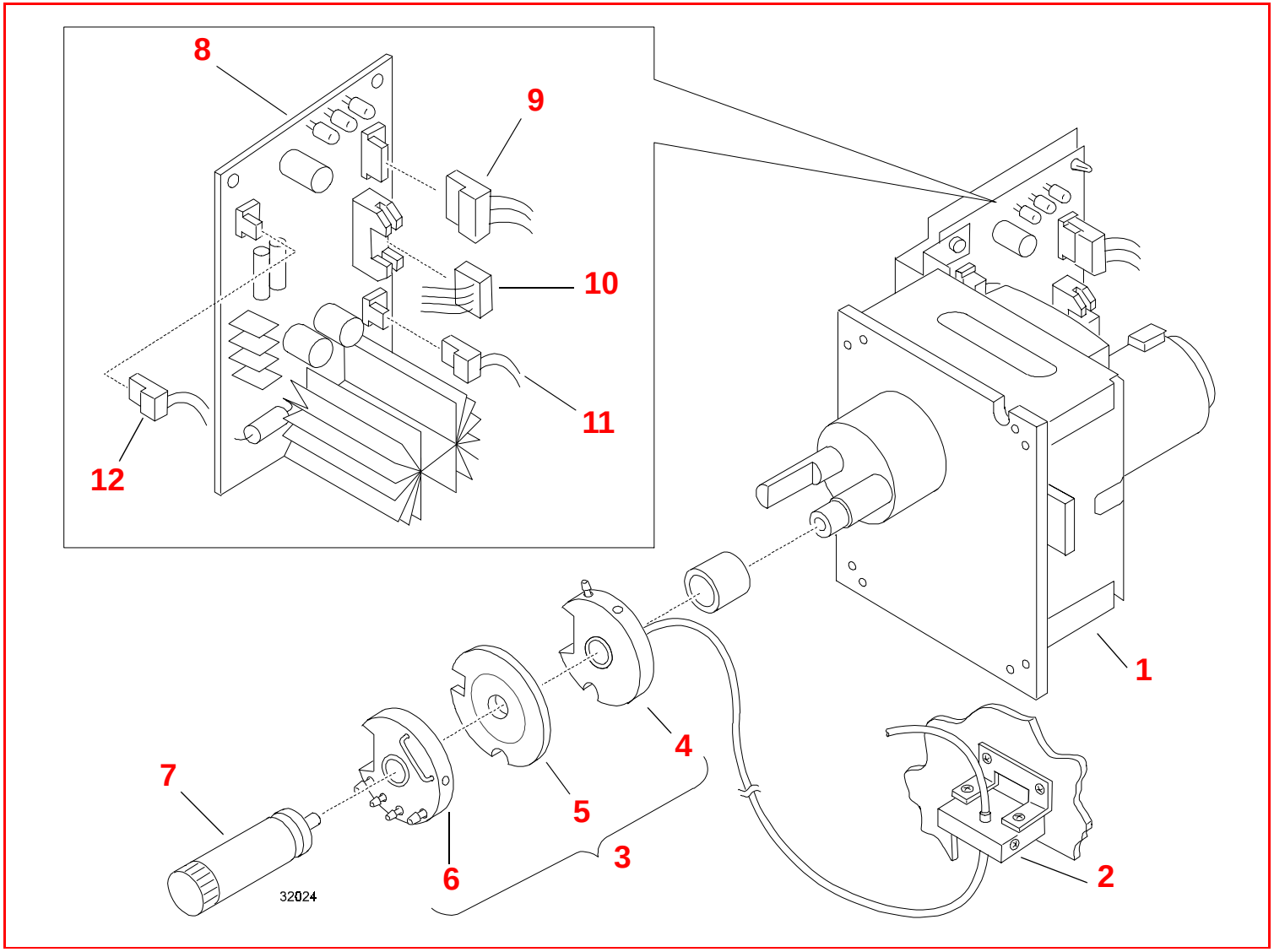
PL-8 Peri-Pump, Sample Handler Module #1, & Open Probe Assembly (1 of 2)



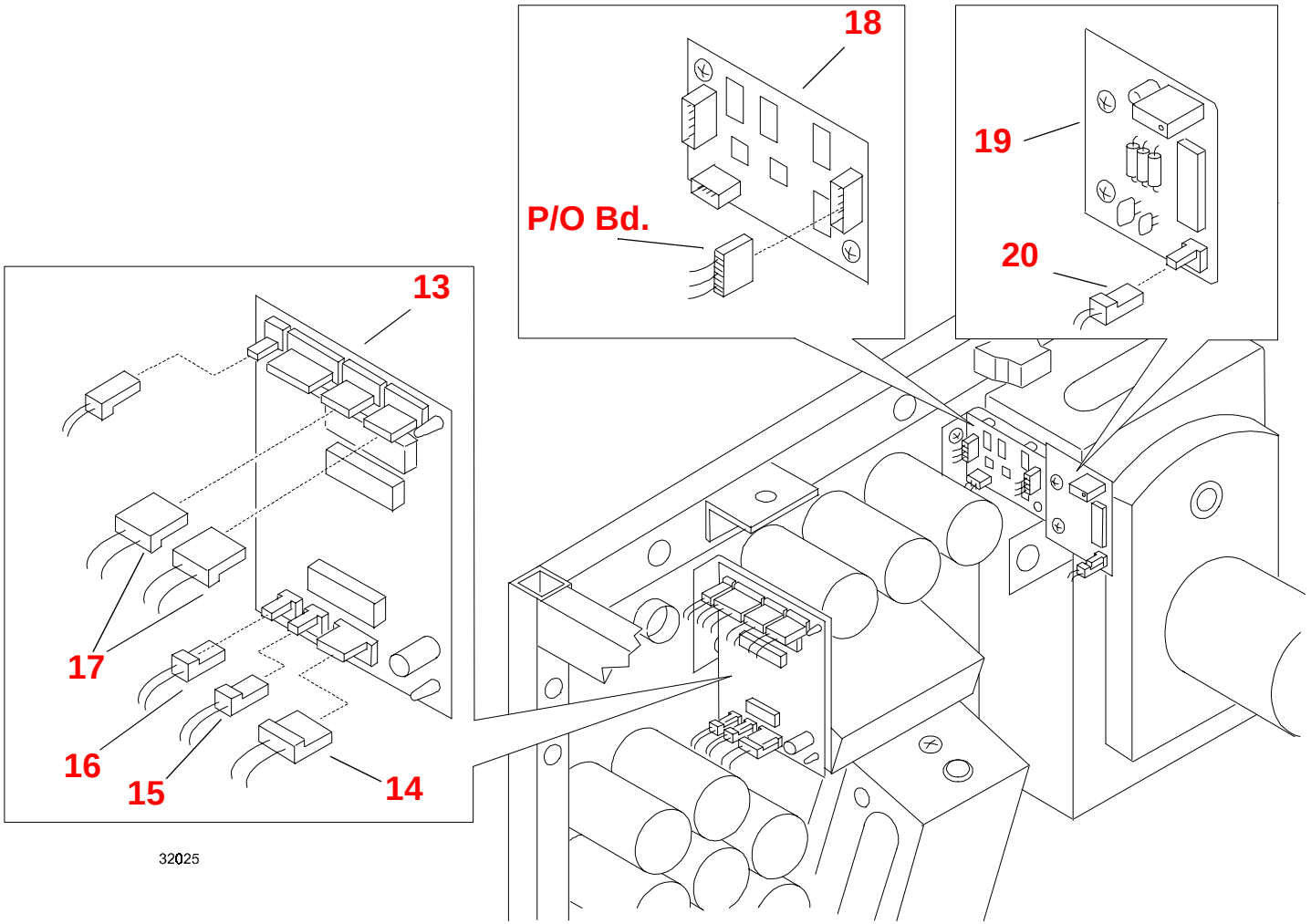
PL-8 Peri-Pump, Sample Handler Module #1, & Open Probe Assembly (2 of 2)

Item	Part #	Description
1	8921137801	Pump Assy, Peristaltic
2	8952056301	Cable, MPM-J9 to CDB G-J1
3	8921076101	Motor, Stepper
4	91485-01	Tubing, Peristaltic Pump
5	8921071001	Pump Roller Assy
6	8960191001	Bd. Sample Handler Module, SHM
7	8952089201	Cable, SHM1-J16 to CPU-J1
8	8952088301	Cable, SHM1-J13 to GS1 MOT
9	8952089401	Cable, SHM1-J12 to PDM-J12
10	8952088401	Cable, SHM1-J1 to GS2 SOL
11	8952088201	Cable, SHM1-J8 to Spin Motor
12	8952078001	Cable, Nose Cover Sensor
13	8952087201	Cable, SHM1-J9 to Sensors
14	8921206101	Driver Assy, Y-Valve, Complete
15	8921207701	Motor, Y-Valve
16	8370830101	Sensor, Photodiode & LED
17	8952087101	Cable, Y-Valve Sensor
18	8250900301	Valve, Rotary, 3-Port
19	8370181801	Sensor, Sample, Ultrasonic

PL-9 Shear Valve Driver, Motor Driver Module, & Sample Sensor Boards (1 of 3)



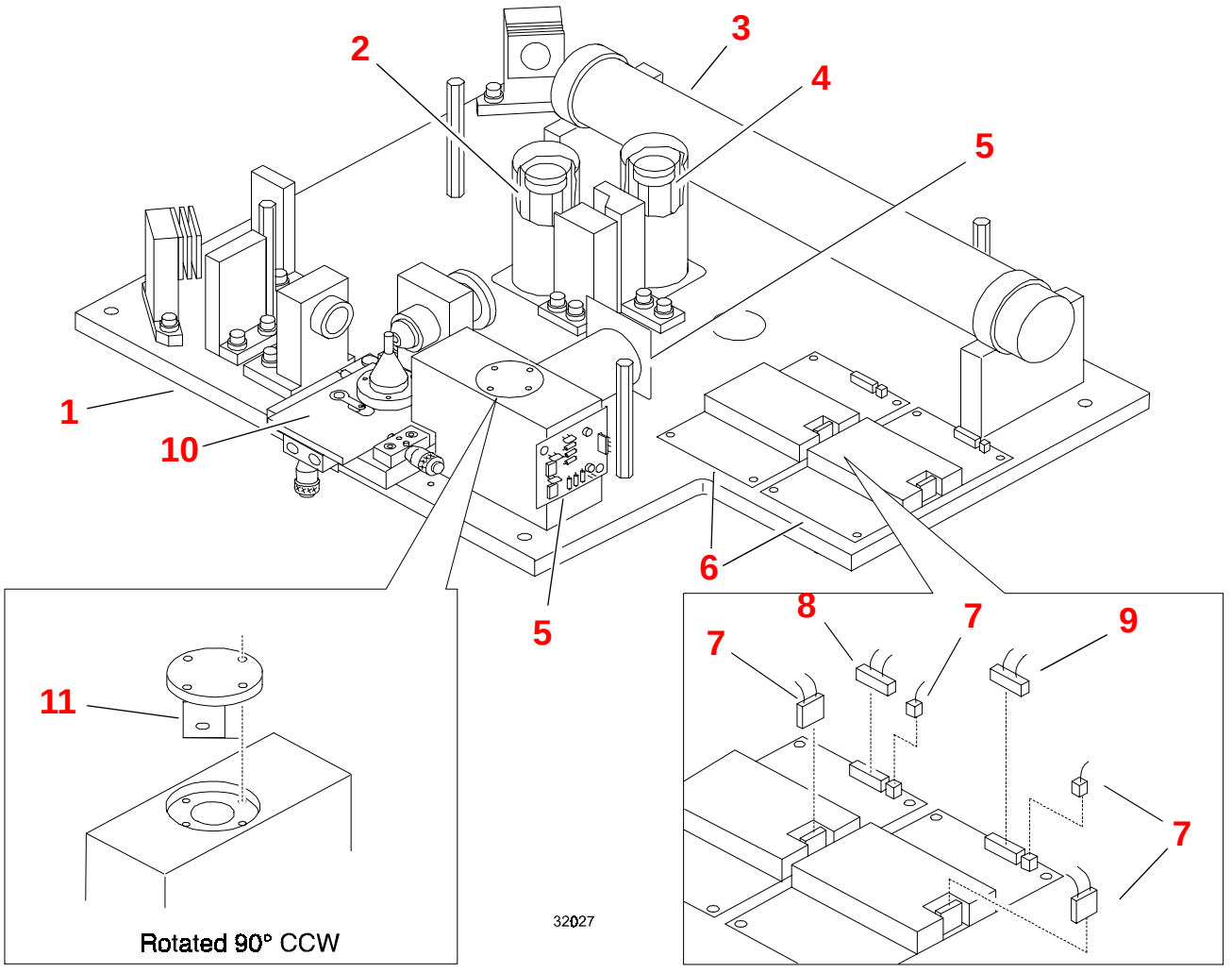
PL-9 Shear Valve Driver, Motor Driver Module, & Sample Sensor Boards (2 of 3)



PL-9 Shear Valve Driver, Motor Driver Module, & Sample Sensor Boards (3 of 3)

Item	Part #	Description
1	8921204901	Shear Valve Driver Assy
2	8960116701	Sensor, Sample Detector
3	N/A	Smpl Valve Ceramics, 3 PCS
4	8932102801	Smpl Valve Ceramic, Rear
5	06H64-01	Smpl Valve Ceramic, Center
6	8932103101	Smpl Valve Ceramic, Front
7	8921167901	Knob, Sample Valve
8	8960222001	Bd, Shear Valve Driver, SVDM
9	8952086201	Cable, SVDM-J2 to FCM-J8
10	8952078501	Cable, SVDM-J1 to Sensors
11	8952086901	Cable, SVDM J3 to PSM (B)-J3
12	8952087401	Cable, SVDM J4 to DC Motor
13	8960194001	Bd, DC Motor Driver Module
14	8952078901	Cable, PDM-J5 to MDM-J3
15	8952079601	Cable, MDM-J2 to SDM4-J7
16	8952079501	Cable, MDM-J1 to SDM4-J8
17	8952087101	Cable, Y-Valve Sensor
18	8370181801	Bd, Ultrasonic Sensor
19	8960116701	Bd, Sample Sensor#2
20	8952082001	Cable, SS2-J1 to FCM-J14

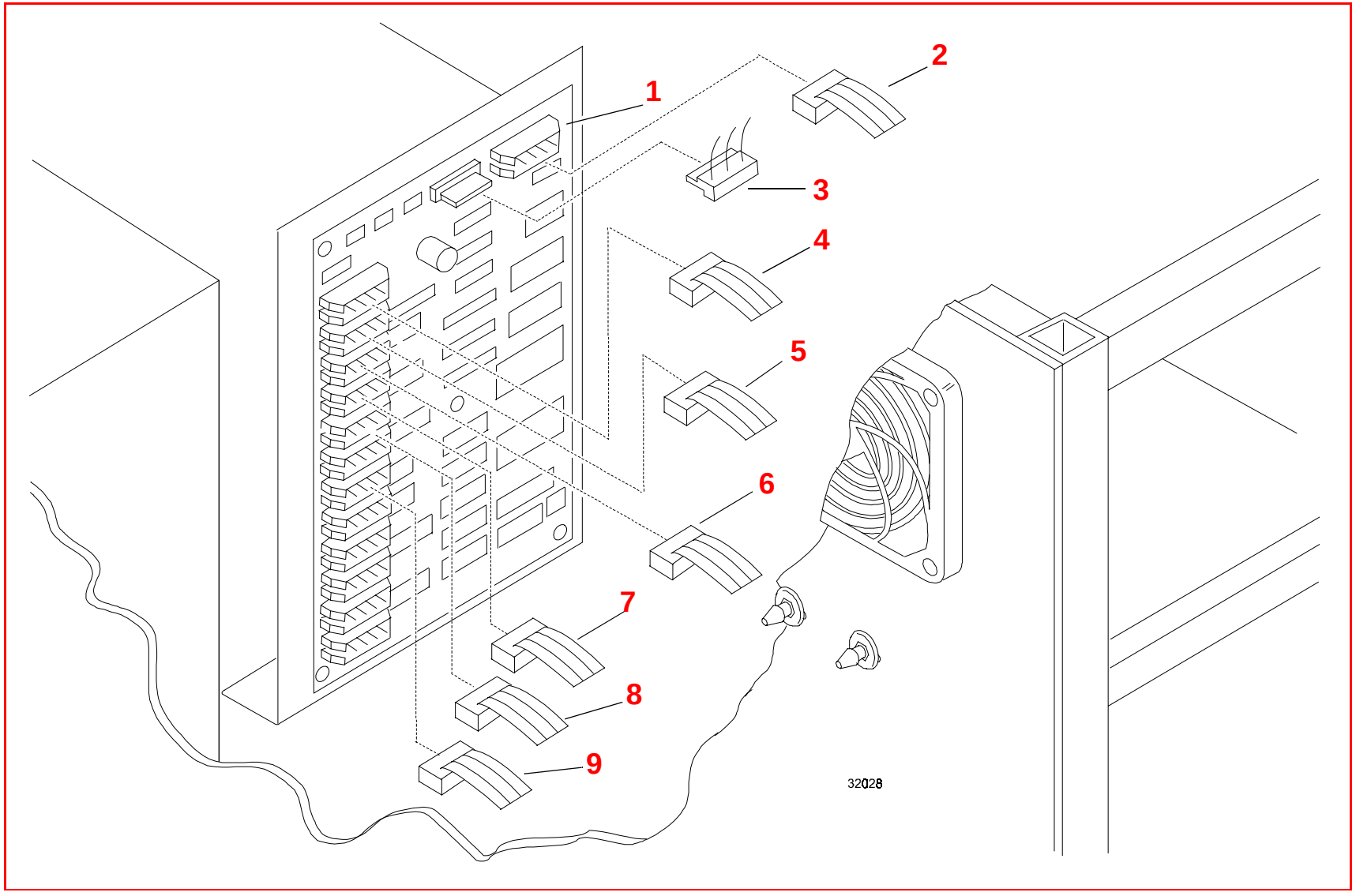
PL-10 Laser Bench (1 of 2)



PL-10 Laser Bench (2 of 2)

Item	Part #	Description
1	8921206401	Bench, Optics (Complete)
2	8010131201	Tube, Photomult, 90^0
3	8921137501	Laser, HeNe, 5mw
4	8570000101	Tube, Photomult, 90^0 DEP
5	8960100001	Bd, Photodiode Preamp
6	8960101001	Bd, HV/Preamp
7	8921142901	Cable, PMT Socket
8	8952085501	Cable, 90^0 PRE-J2 to MAM-J12
9	8952085601	Cable, 90^0D PRE-J2 to MAM-J14
10	8921145201	Flow Cell, Optical
11	8921181501	Mirror Perforated

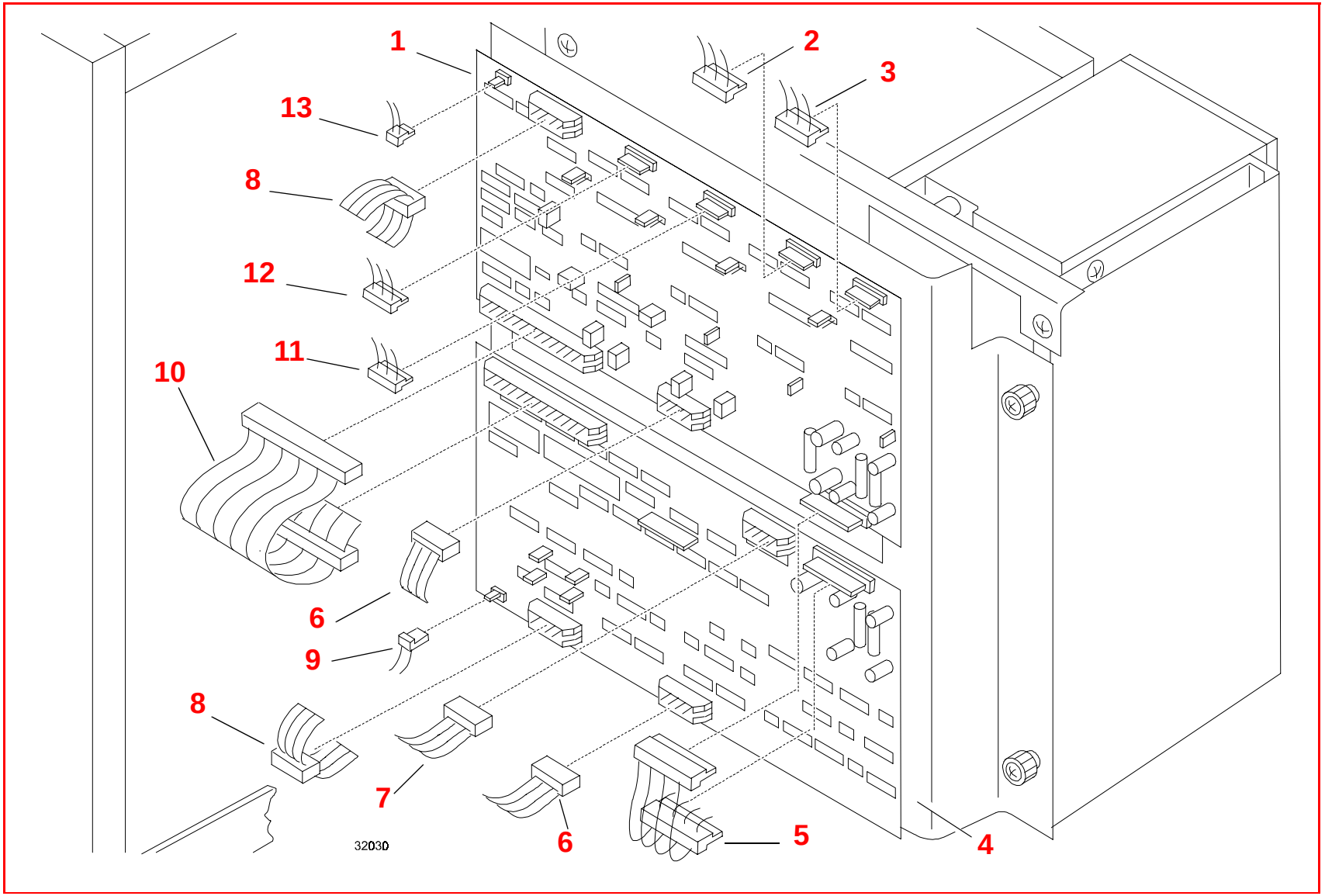
PL-11 Motor Processor Module (1 of 2)



PL-11 Motor Processor Module (2 of 2))

Item	Part #	Description
1	8960092001	Bd, Motor Processor, MPM
2	8952084701	Cable, CPU-J6 to MPM-J1
3	8952054301	Cable, PDM-J6 to MPM-J2
4	8952084501	Cable, MPM-J3 to CDB A-J1
5	8952084401	Cable, MPM-J4 to CDB B-J1
6	8952015501	Cable, MPM-J5 to CDB C-J1
7	8952015401	Cable, MPM-J6 to CDB D-J1
8	8952084201	Cable, MPM-J7 to CDB E-J1
9	8952056301	Cable, MPM-J9 to CDB G-J1

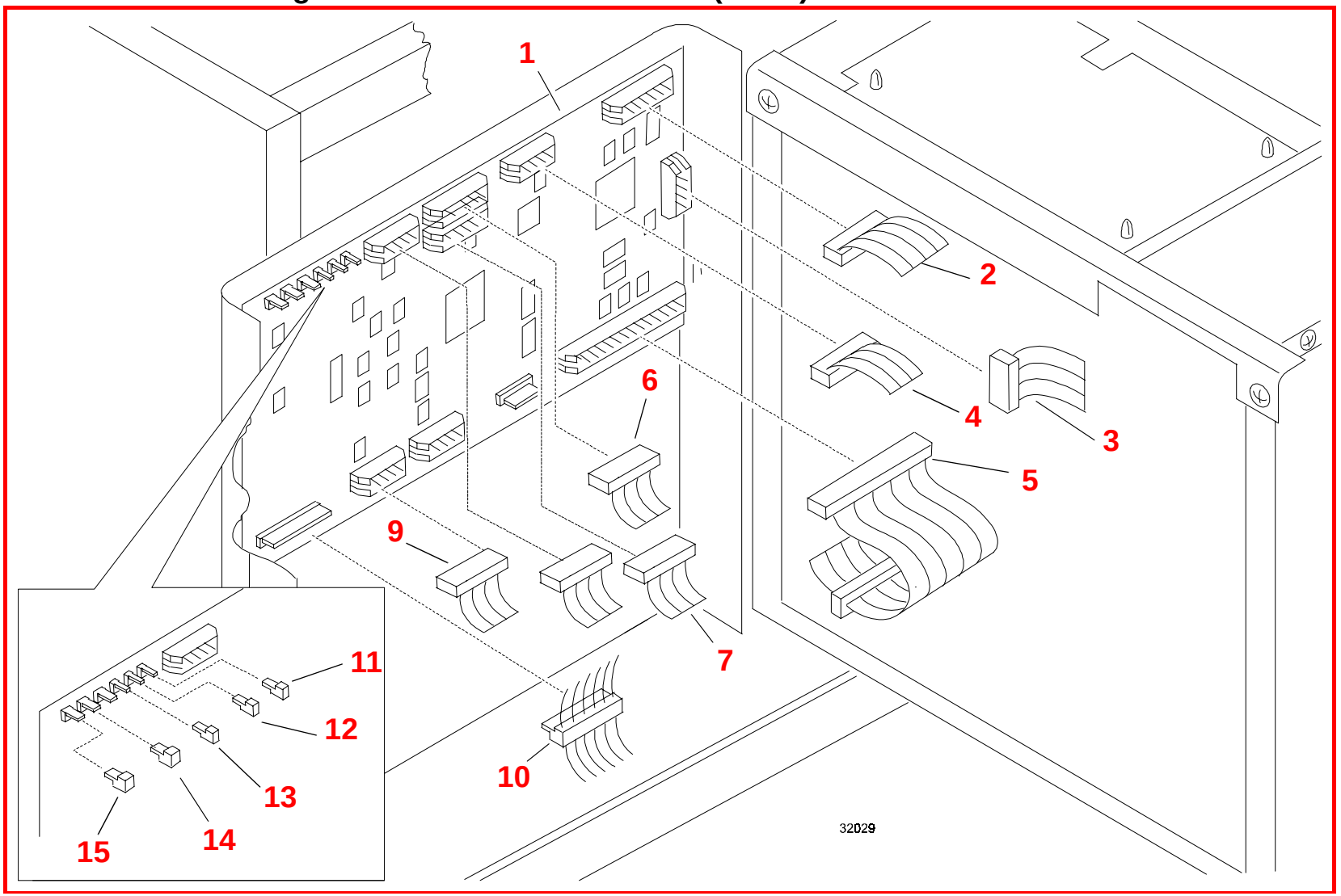
PL-12 Main Amplifier & Signal Processor Modules (1 of 2)



PL-12 Main Amplifier & Signal Processor Modules (2 of 2)

Item	Part #	Description
1	8960195001	Bd, Main Amplifier, MAM
2	8952085501	Cable, 90^0 PRE-J2 to MAM-J12
3	8952085601	Cable, 90^0 D PRE-J2 to MAM-J14
4	8960183001	Bd, Signal Processor, SPM
5	8952086501	Cable, MAM-J3 to PDM-J4
6	8952084801	Cable, MAM-J15 to SPM-J6
7	8952050001	Cable, SPM-J4 to CPU-J3
8	8952084101	Cable, MUX DAC CTRL Bus
9	8952050501	Cable, CPU-J10 to SPM-J5
10	8952084601	Cable, External CPU Bus
11	8952085401	Cable, MAM-J12 to PD PRE
12	8952085301	Cable, MAM-J10 to PD PRE
13	8952050601	Cable, MAM-J4 to CPU-J9

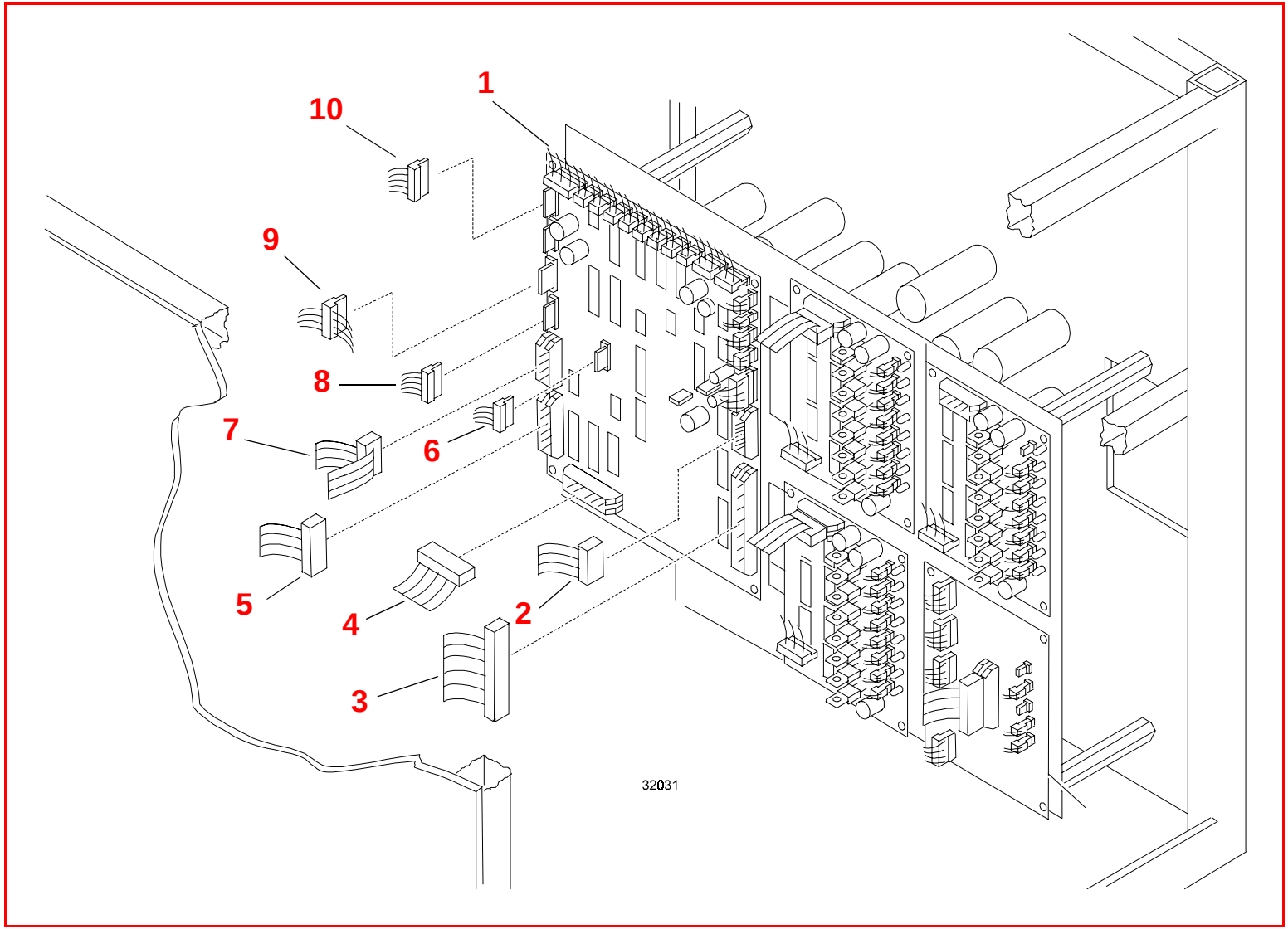
PL-13 Central Processing Unit/Device Control Module (1 of 2)



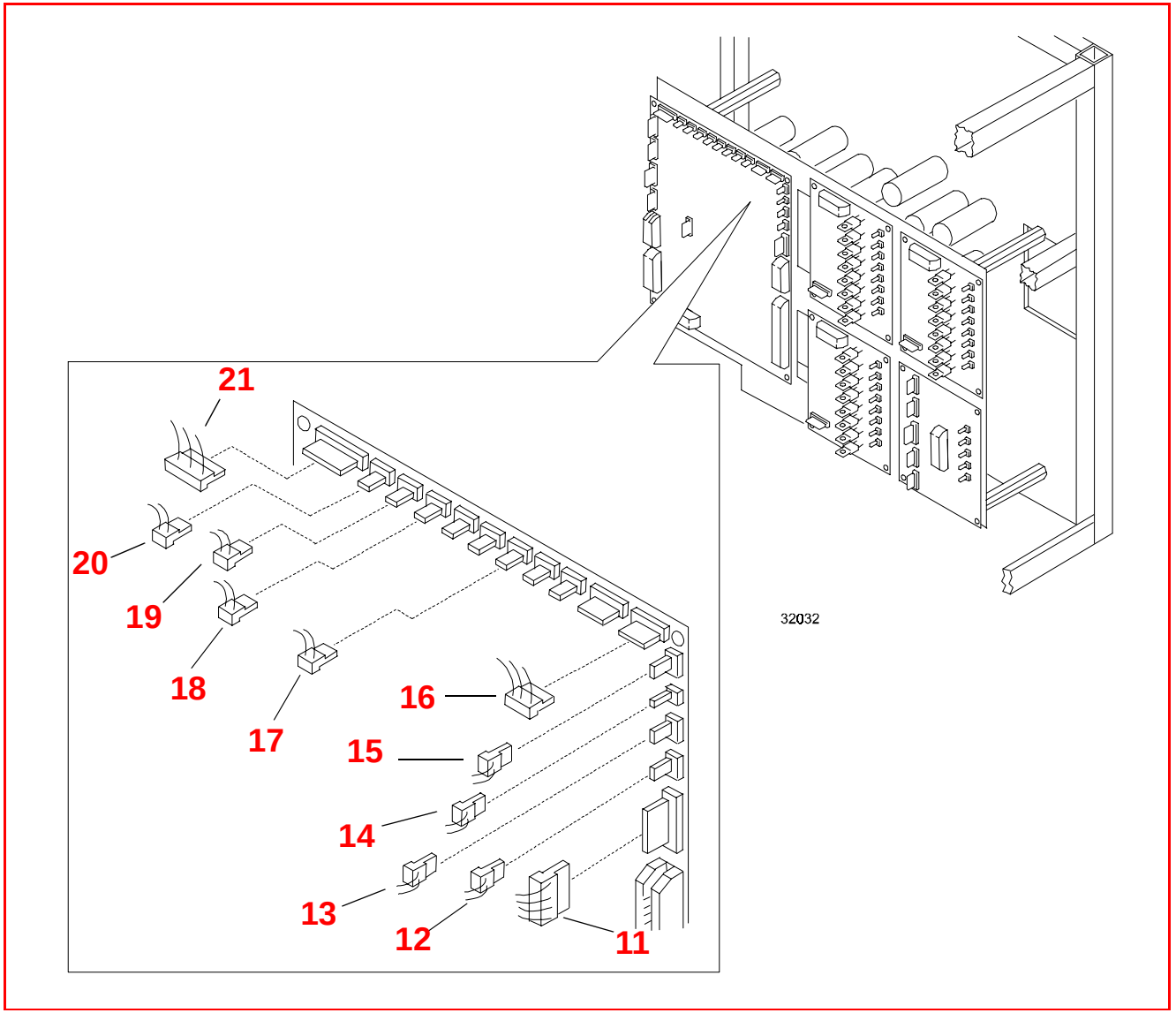
PL-13 Central Processing Unit/Device Control Module (2 of 2)

Item	Part #	Description
1	8960182001	Bd, CPU/DCM
2	8952084901	Cable, Serial Periph Bus
3	8952086401	Cable, HSSL (Internal)
4	8952084701	Cable, CPU-J6 to MPM-J1
5	8952084601	Cable, External CPU Bus
6	8952089301	Cable, CPU-J17 to SHM2-J16
7	8952089201	Cable, CPU-J1 to SHM1-J16
8	8952084101	Cable, MUX DAC CTRL Bus
9	8952050001	Cable, CPU-J3 to SPM-J4
10	8952086501	Cable, PDM-J4 to MAM-J3
11	8952085001	Cable, CPU-J12 to SPM-J7
12	8952050601	Cable, MAM-J4 to CPU-J9
13	8952085201	Cable, CPU-J7 to FCM-J25
14	8952050501	Cable, CPU-J10 to SPM-J5
15	8952085101	Cable, CPU-J8 to FCM-J22

PL-14 Flow Control Module, View #1 (1 of 3)



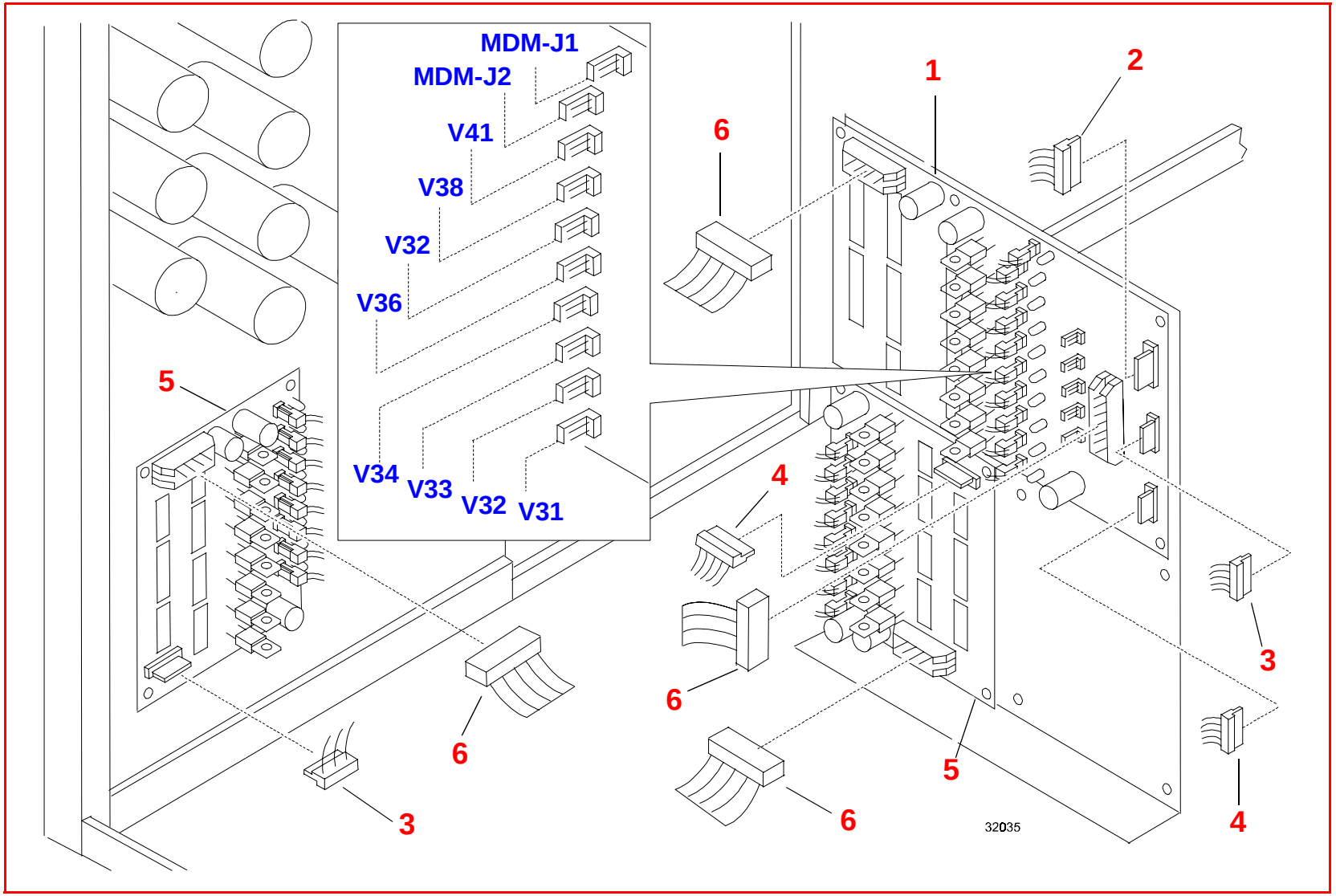
PL-14 Flow Control Module, View #1 (2 of 3)



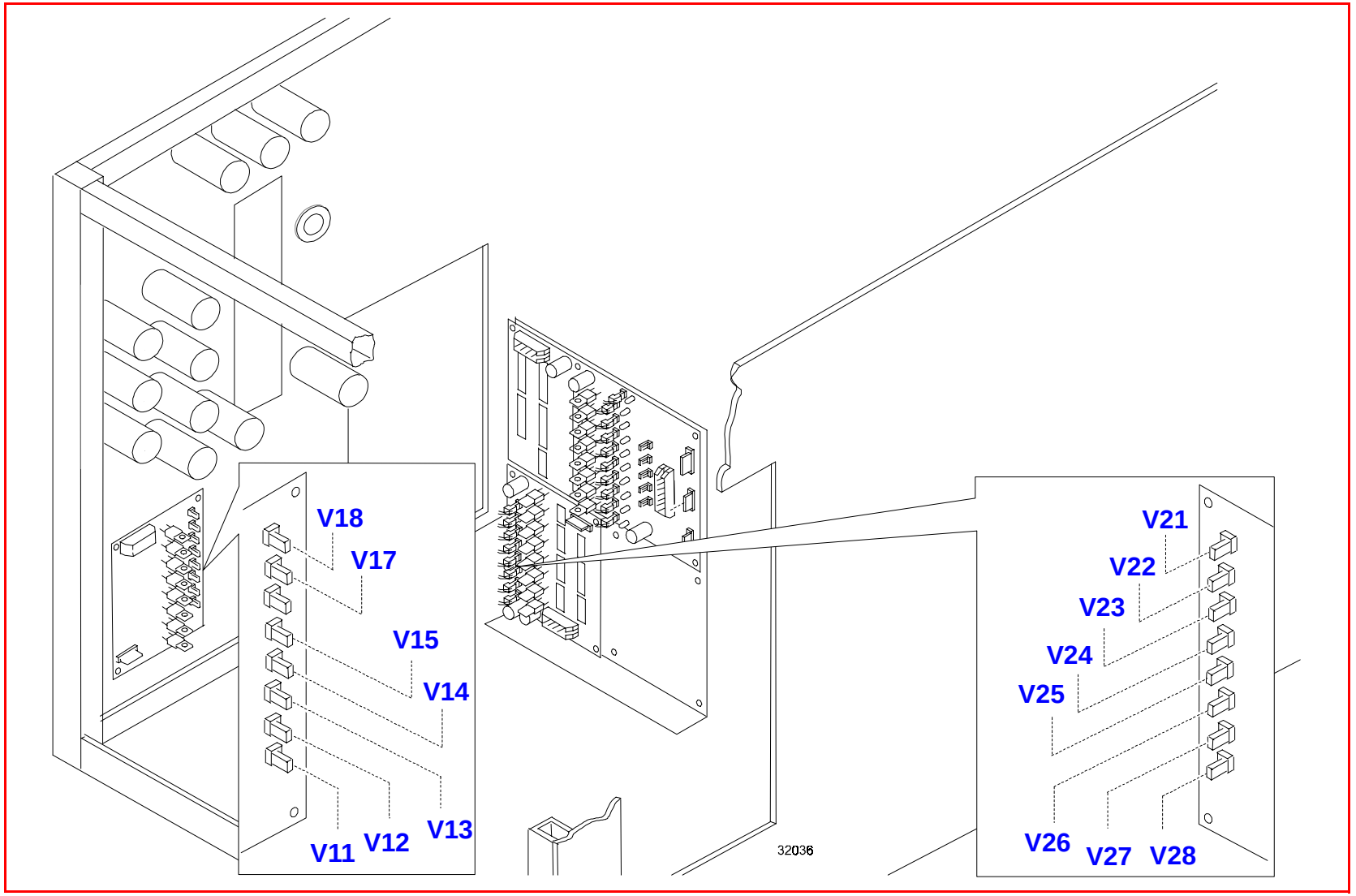
PL-14 Flow Control Module, View #1 (3 of 3)

Item	Part #	Description
1	8960132001	Bd, Flow Control Module, FCM
2	8952084101	Cable, MUX DAC CTRL Bus
3	8952084901	Cable, Serial Periph Bus
4	8952082501	Cable, FCM-J1 to CDM1-J6
5	8952082601	Cable, FCM-J2 to CDM2-J6
6	8952087001	Cable, FCM-J26 to ILSB-J1
7	8952083701	Cable, SDM Data/+5V Bus
8	8952086101	Cable, FCM-J4 to SDM9-J10
9	8952086601	Cable, FCM-J5 to PSM(B)-J1
10	8952083801	Cable, FCM-J7 to SAB-J1
11	8952082901	Cable, FCM-J21 to PDM-J8
12	8952085101	Cable, FCM-J22 to CPU-J8
13	8952083101	Cable, FCM-J23 to VPM-J13
14	8952083201	Cable, FCM-J24 to VPM-J14
15	8952085201	Cable, FCM-J25 to CPU-J7
16	8952038501	Cable, FCM-J-8 to HGB F. Cell
17	8952082001	Cable, SS2-J1 to FCM-J14
18	N/A	Cable, P/O Ultrasonic Sen
19	8952083901	Cable, FCM-J10 to DIL OP Sen
20	8952078301	Cable, FCM-J9 to Start SW
21	8952086201	Cable, FCM-J8 to SVDM-J2

PL-15 Solenoid Driver Modules 1, 2, & Solenoid Driver Module/Cable Distribution Module (1 of 3)



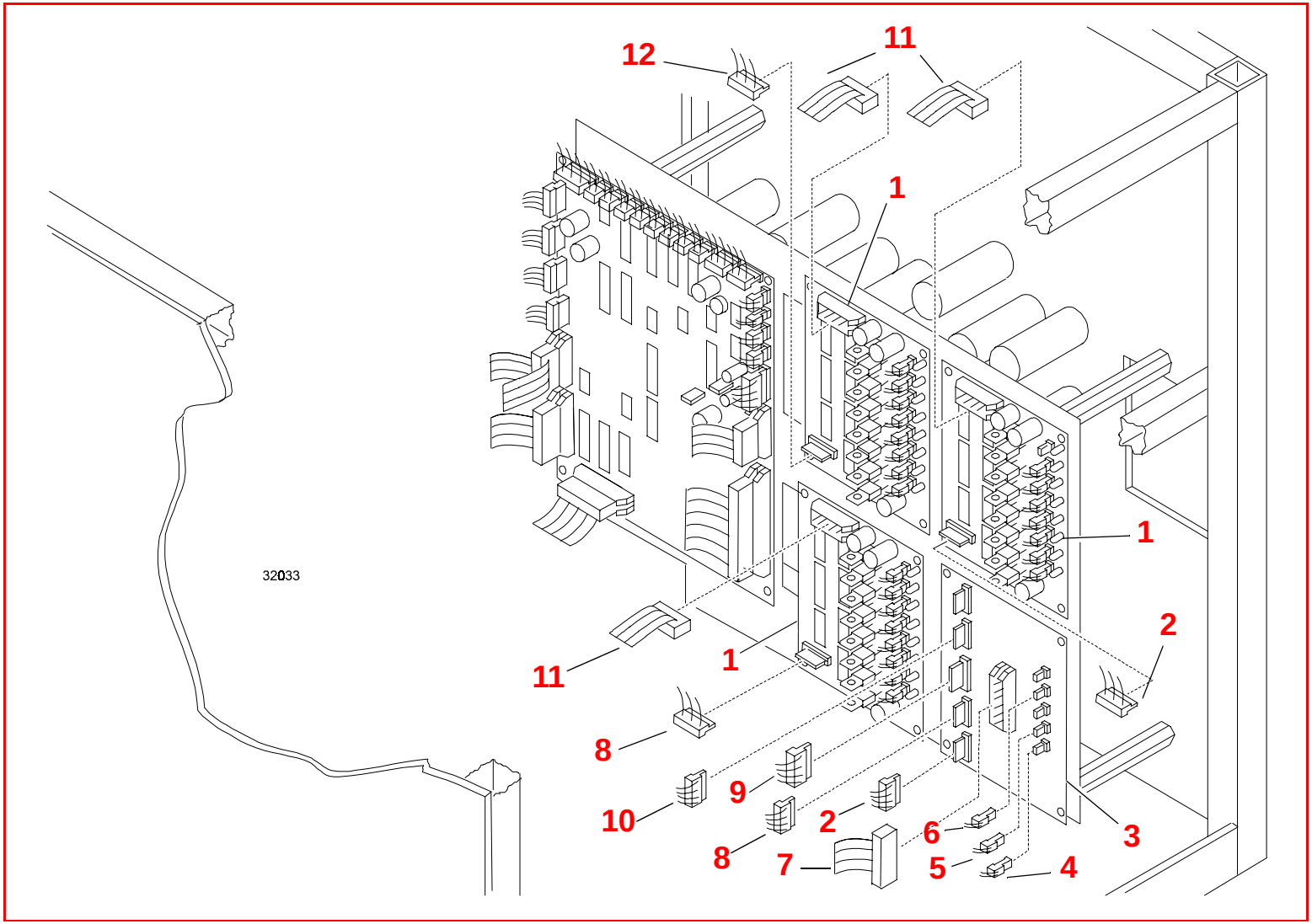
PL-15 Solenoid Driver Modules 1, 2, & Solenoid Driver Module/Cable Distribution Module (2 of 3)



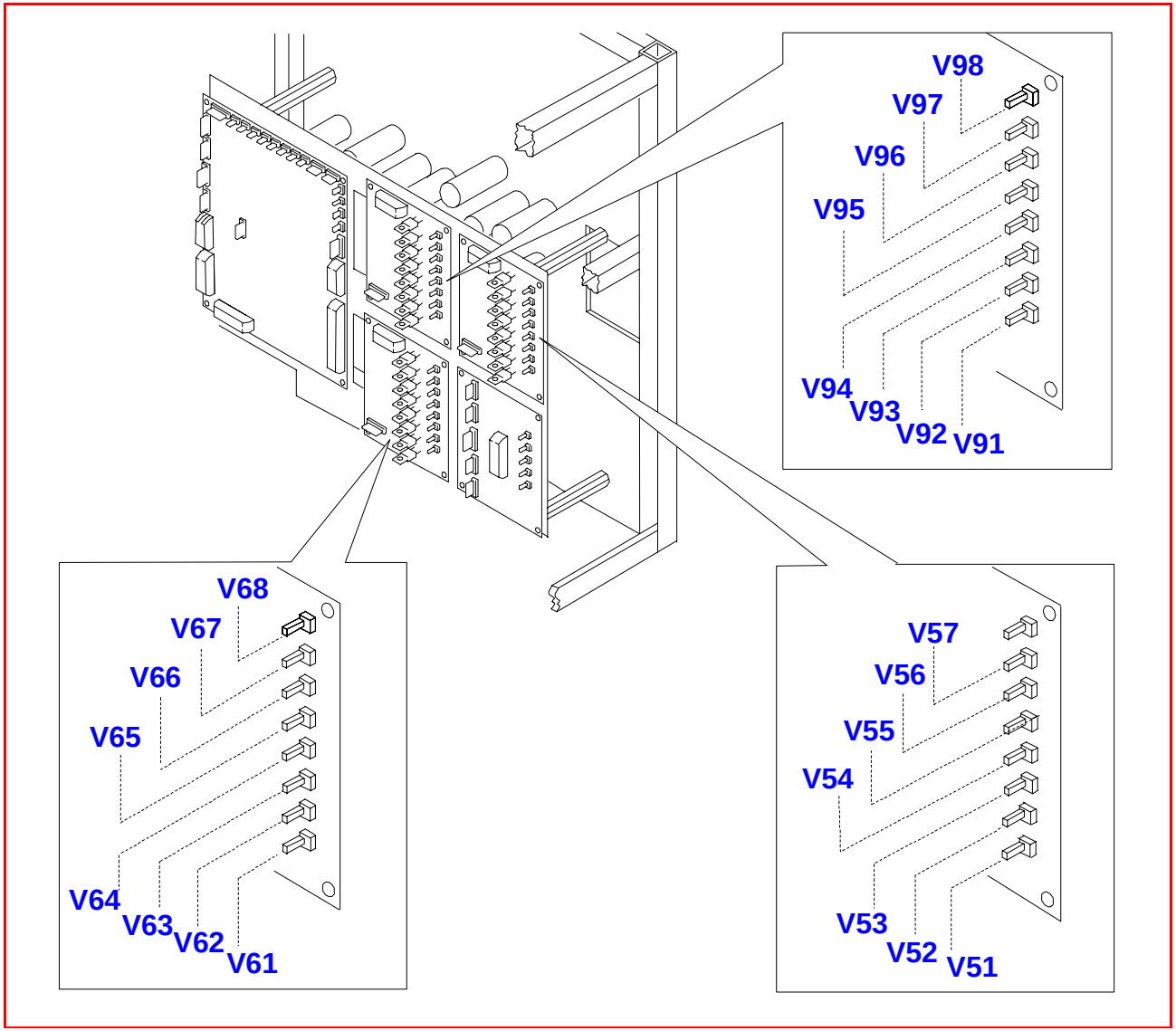
PL-15 Solenoid Driver Modules 1, 2, & Solenoid Driver Module/Cable Distribution Module (3 of 3)

Item	Part #	Description
1	8960205001	Bd, SDM/CDM
2	8952082801	Cable, PSM (Back)-J2 to CDM1-J3
3	8952083001	Cbl, SDM/CDM-J1 to SDM1-J10
4	8952085801	Cbl, SDM/CDM-J2 to SDM2-J10
5	8960093001	Bd, Solenoid Driver Module, SDM
6	8952083701	Cable, SDM Data/+5V Bus

PL-16 Solenoid Driver Modules 5,6,9 & Cable Distribution Module #2 (1 of 3)



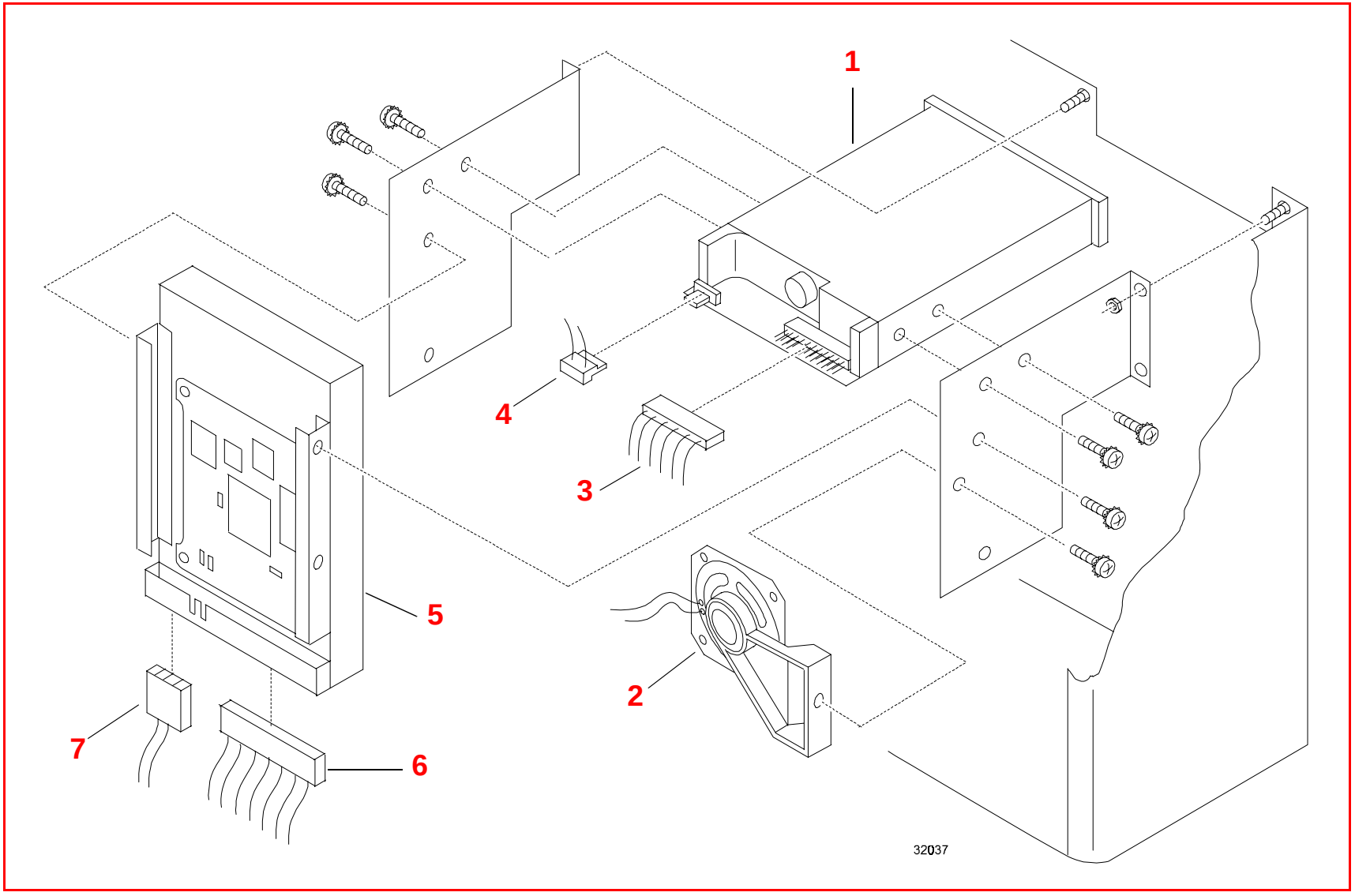
PL-16 Solenoid Driver Modules 5,6,9 & Cable Distribution Module #2 (2 of 3)



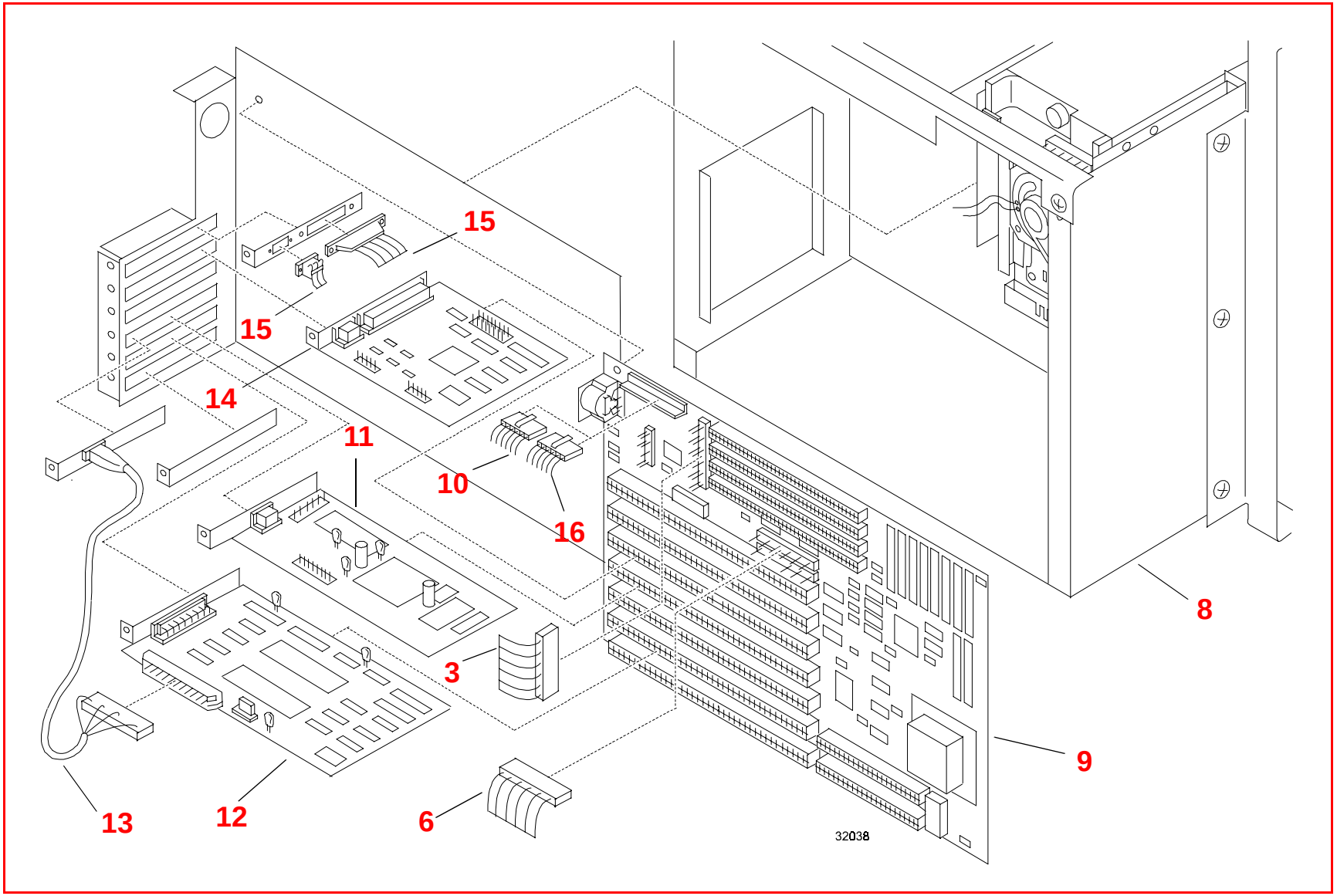
PL-16 Solenoid Driver Modules 5,6,9 & Cable Distribution Module #2 (3 of 3)

Item	Part #	Description
1	8960093001	Bd, Solenoid Driver Module, SDM
2	8952085901	Cable, SDM5-J10 to CDM2-J1
3	8960108001	Bd, Cable Dist Module, CDM
4	8952085701	Cable, CDM2-J7 to EXT Waste
5	8952083501	Cable, CDM2-J8 to DIL Sensor
6	8952083601	Cable, CDM2-J10 to SH Sensor
7	8952082601	Cable, CDM-J6 to FCM-J2
8	8952086001	Cable, SDM5-J10 to CDM2-J2
9	8952086601	Cable, DCM2-J3 to PSM(B)-J1
10	8952087901	Cable, CDM2-J4 to VPM-J6
11	8952083701	Cable, SDM Data/+5V Bus
12	8952086101	Cable, SDM9-J10 to FCM-J4

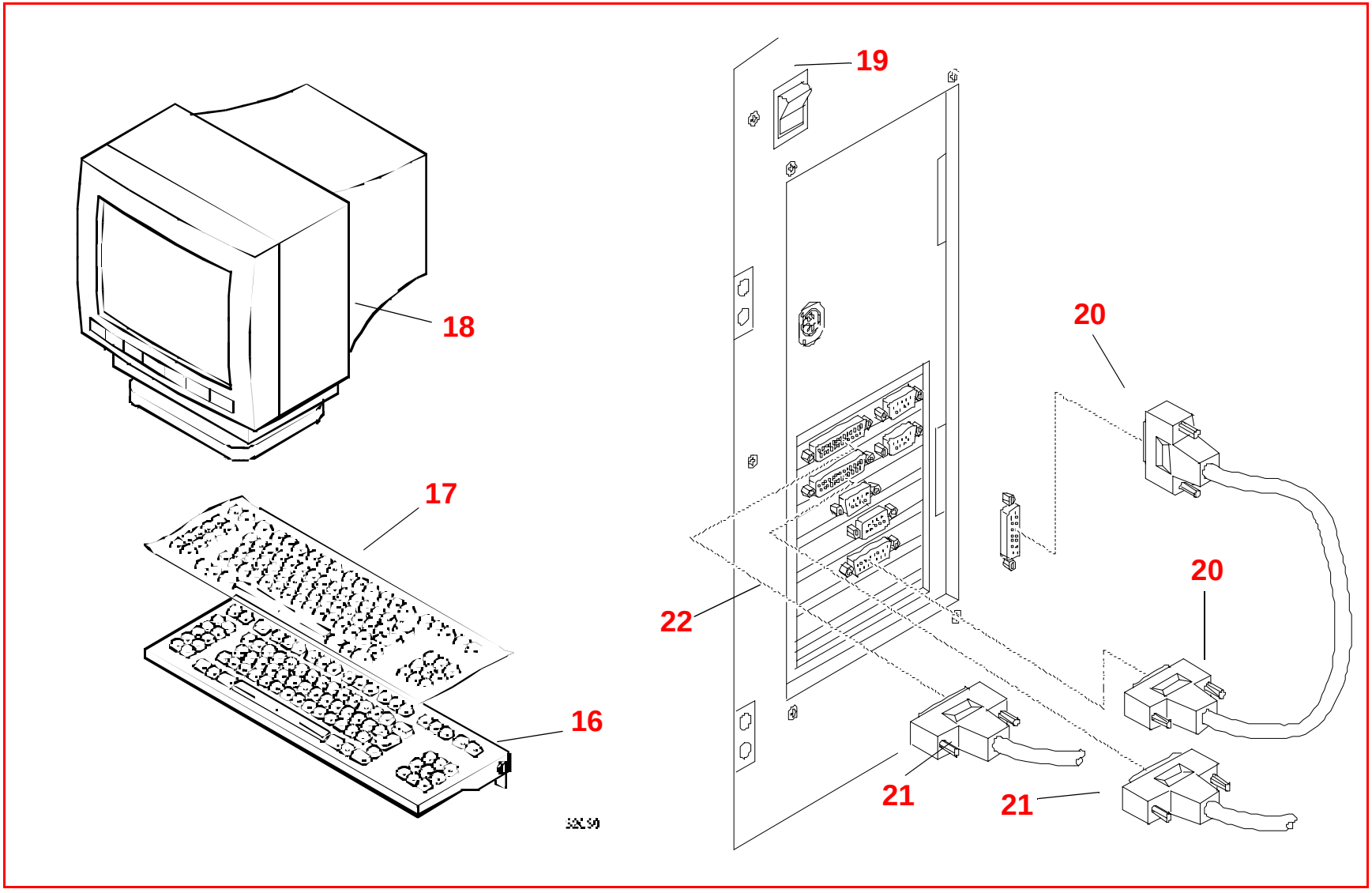
PL-17 Main Computer Boards & Computer Assemblies (1 of 4)



PL-17 Main Computer Boards & Computer Assemblies (2 of 4)



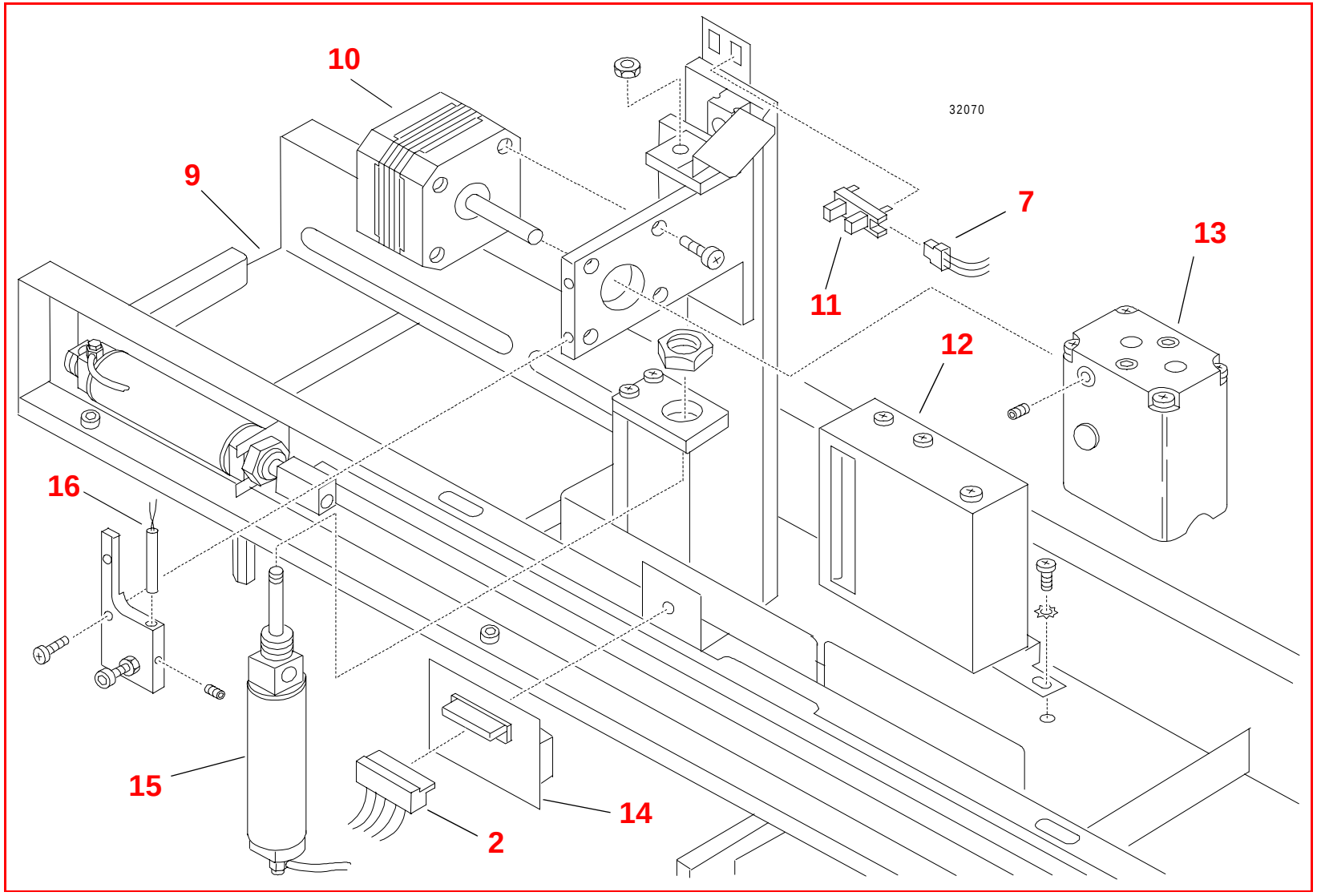
PL-17 Main Computer Boards & Computer Assemblies (3 of 4)



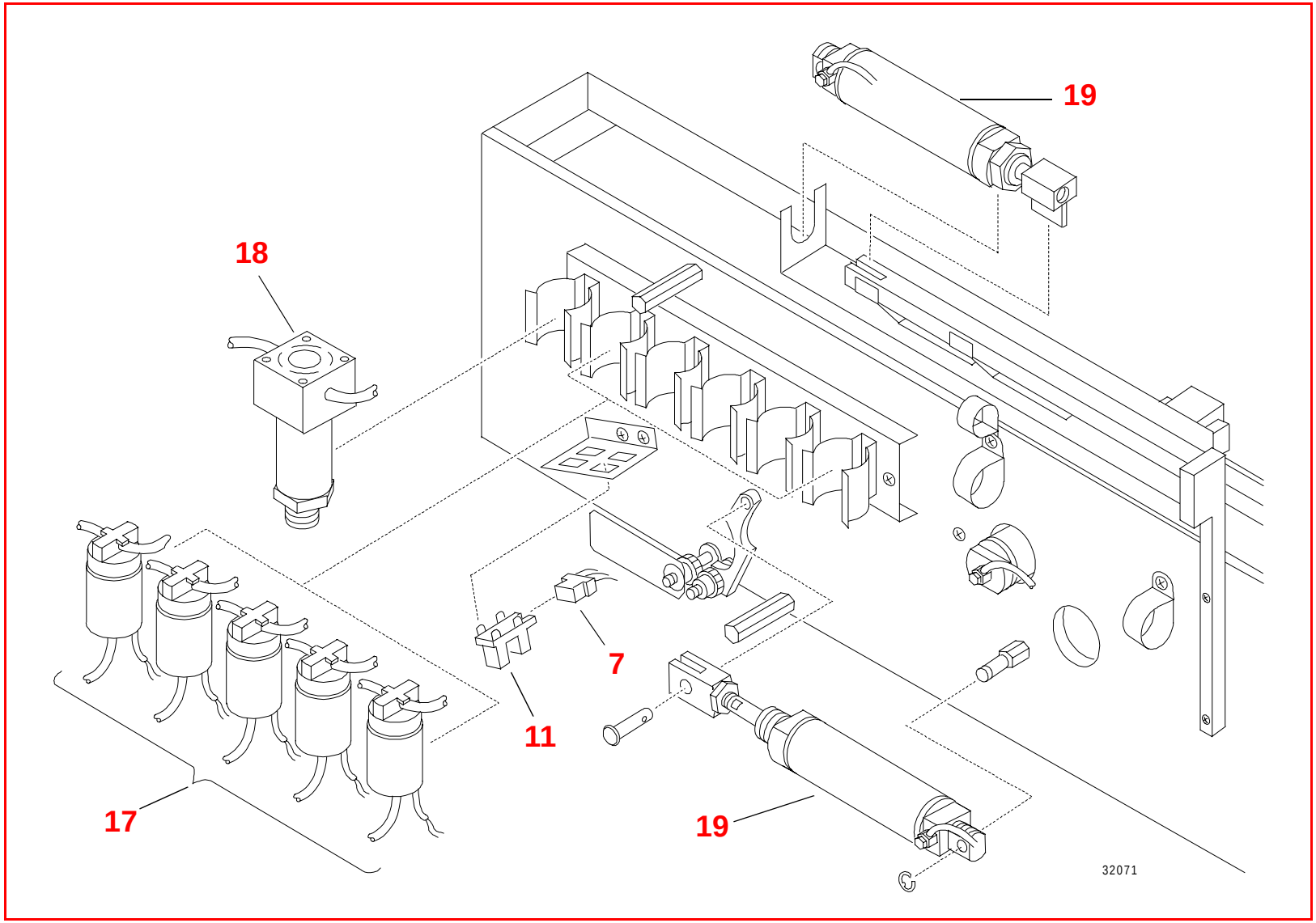
PL-17 Main Computer Boards & Computer Assemblies (4 of 4)

Item	Part #	Description
1	8200570201	Disk Drive, Floppy, 1.44MB
2	8921150601	Speaker Assy
3	8952056201	Cable, Floppy Drive INTFC
4	8952089801	Cable, PDM-J11 to Floppy Drive
5	8200570701	Disk Drive, Hard, 540MB
6	8952064801	Cable, Hard Drive INTFC
7	8952089701	Cable, PDM-J10 to Hard Drive
8	8921205401	Computer Assy, CD3200
9	8921211901	Bd Mother, w/RAM & CPU
10	8952061201	Cable, PDM-J2/J3 to Mother Bd
11	8170001301	Bd, Video, VGA w/1MB RAM
12	8960109001	Bd, SER Link/KBd INTFC
13	8952082401	Cable, HSSL to Monitor
14	8170000701	Bd, I/O Serial/Parallel
15	8600028501	Cable Kit, Internal I/O
16	06H74-01	Keyboard, PCAT
17	06H75-01	Cover, Keyboard
18	04H44-01	Monitor, 14” VGA Color
19	8510751801	Switch, AC Input, 16A
20	8952087017	Cable, Interface, HSSL
21	20005-01	Cable, Printer, Parallel

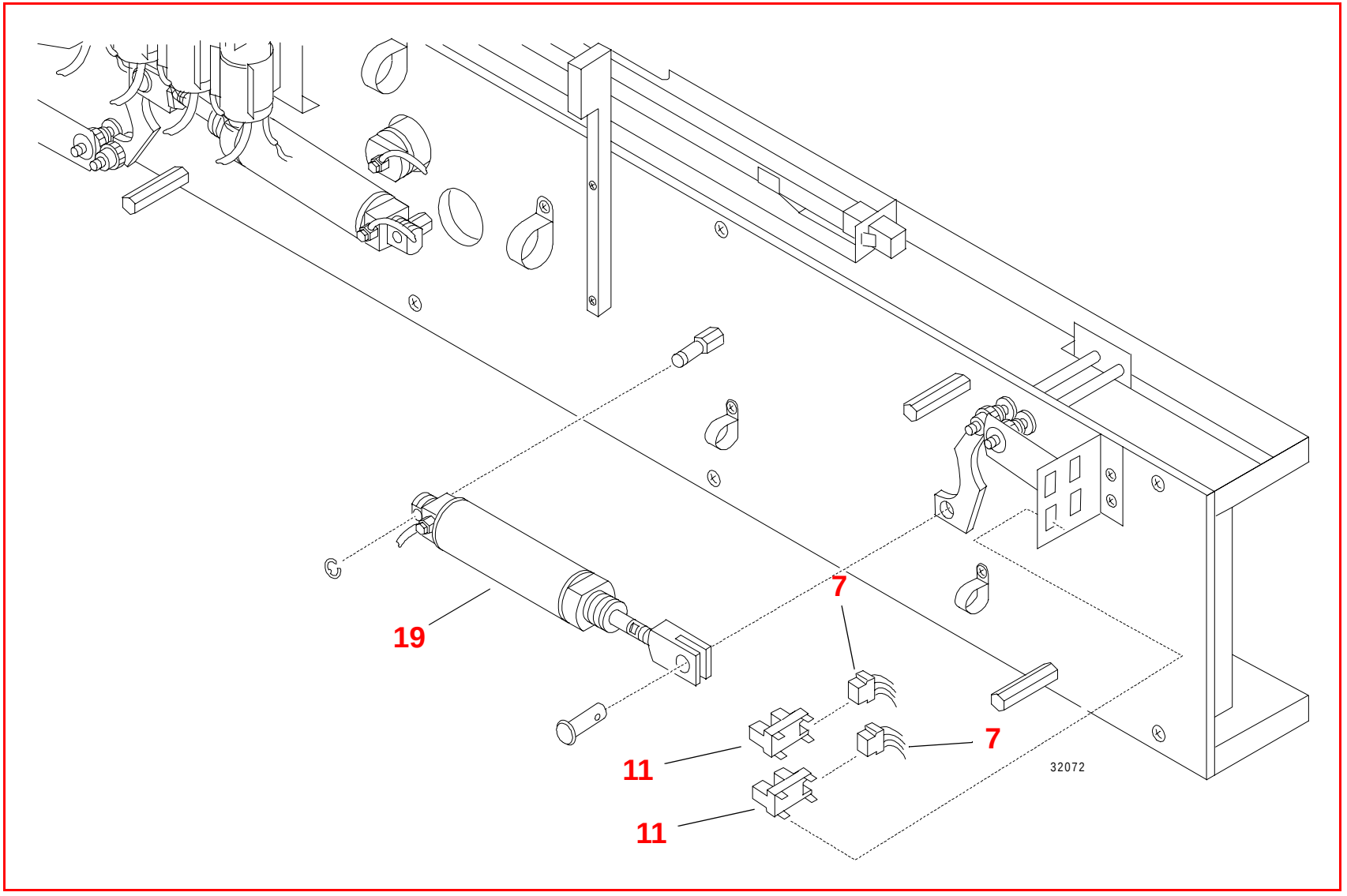
PL-18 Sample Loader (1 of 5)



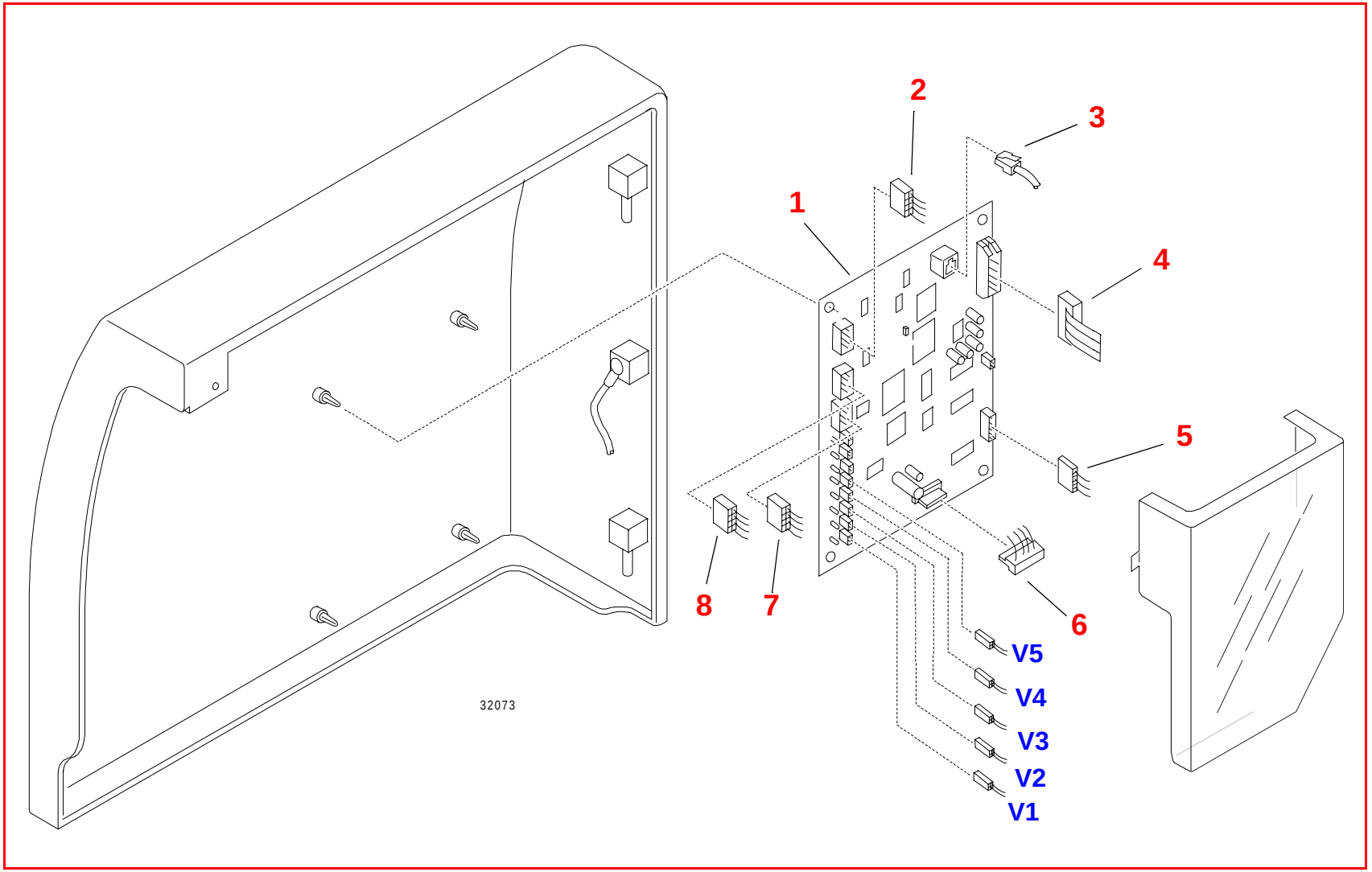
PL-18 Sample Loader (2 of 5)



PL-18 Sample Loader (3 of 5)



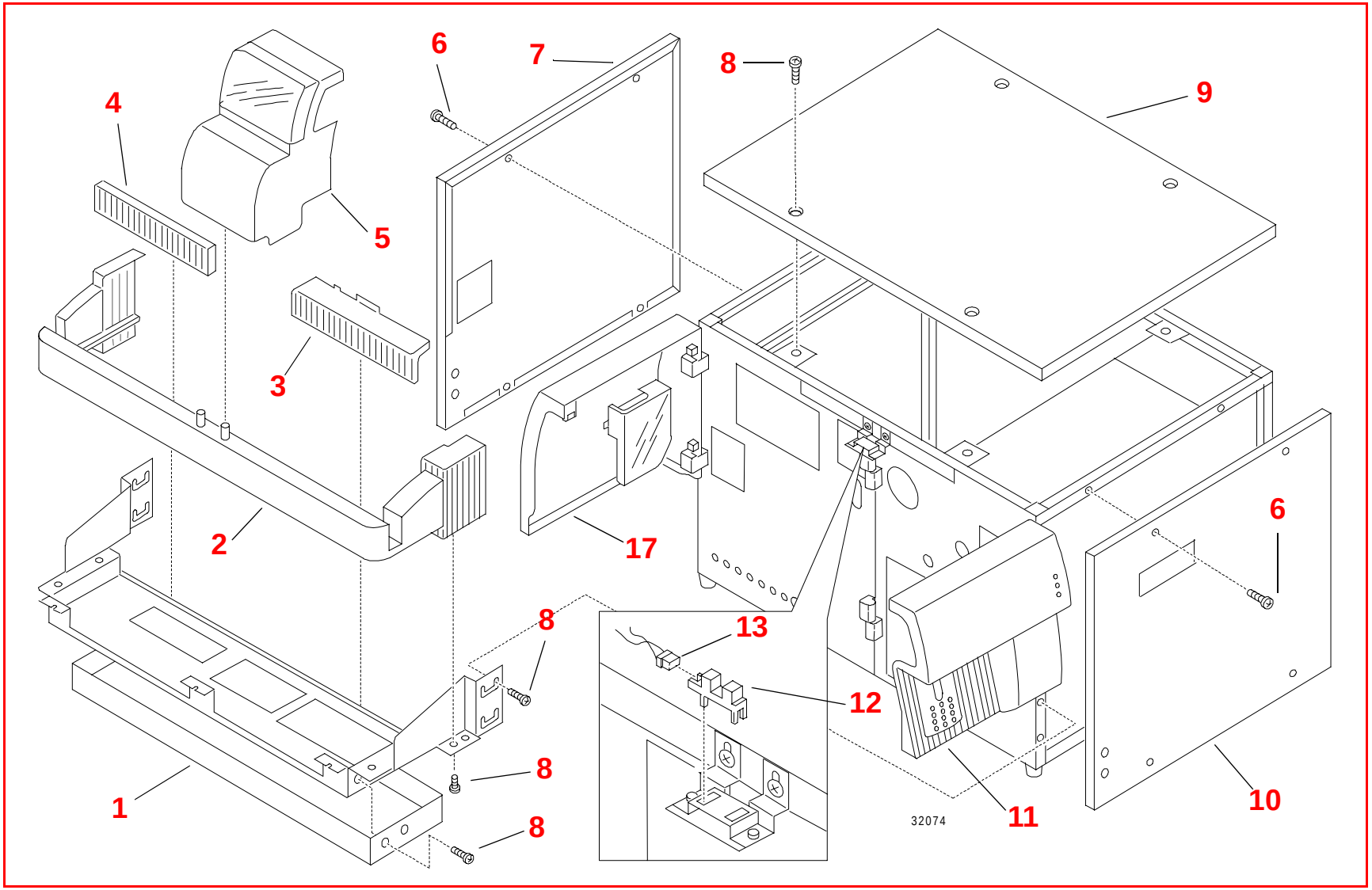
PL-18 Sample Loader (4 of 5)



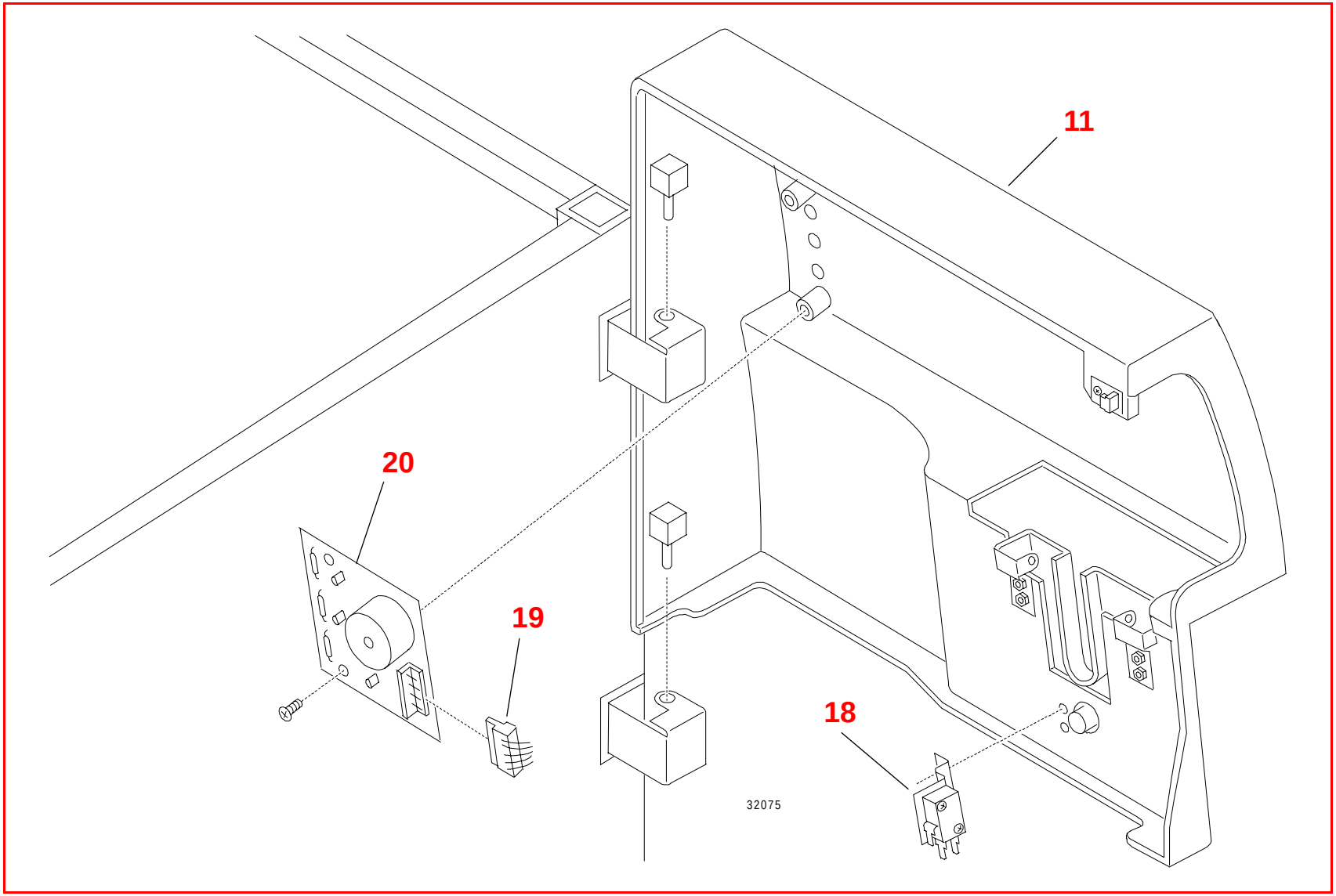
PL-18 Sample Loader (5 of 5)

Item	Part #	Description
1	8960191001	Bd, Sample Handler Module
2	8952058801	Cable, SHM2-J11 to Tube Sens
3	8952058601	Cable, SHM2-J15 to BCD RDR
4	8952089301	Cable, SHM2-J16 to CPU-J17
5	8952089001	Cable, SHM2-J13 to MIX MTR
6	8952089501	Cable, SHM2-J12 to PDM-J13
7	8952088701	Cable, SHM2-J9 to RACK Sens
8	Part of Sensor	Cable, SHM2-J10 to MIX Sens
9	8921211601	Sample Loader, Complete
10	8350602501	Motor, Stepper, Mixer
11	8370830101	Sensor, Photodiode & LED
12	8934001701	Barcode Reader
13	8921208301	Mixer Head, Complete
14	8960211001	Bd, Sensor, Sample Tube
15	2880860801	Cylinder, Air, Mixer Lift
16	8510510101	Switch, Reed, w/Cable
17	8450876601	Valve, Solenoid, 3-Way
18	8310842201	Regulator, Pressure
19	8280861301	Cylinder, Air, X & Y Index
20	8932074001	Shield, SHM #1, 2

PL-19 Covers (1 of 3)



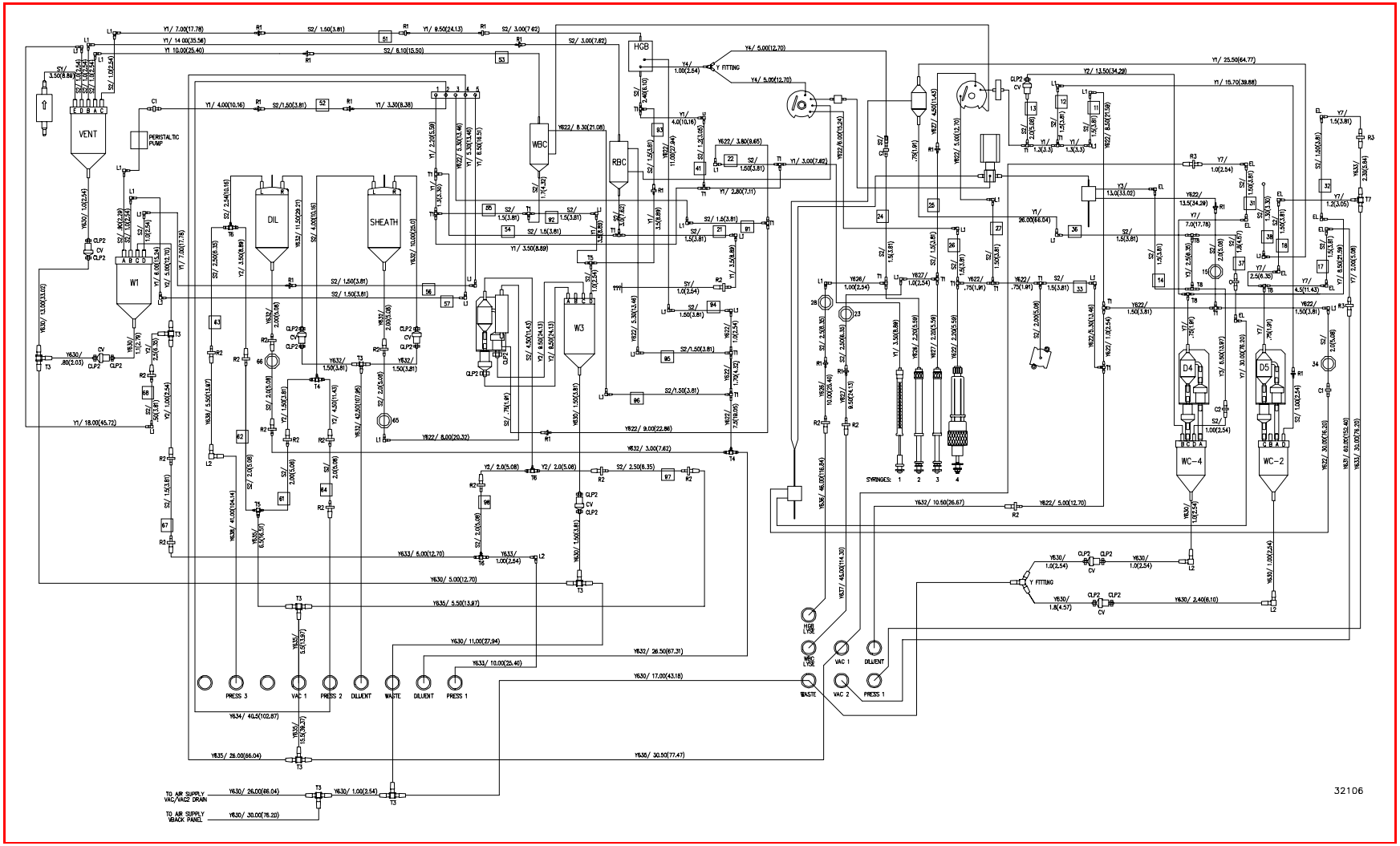
PL-19 Covers (2 of 3)



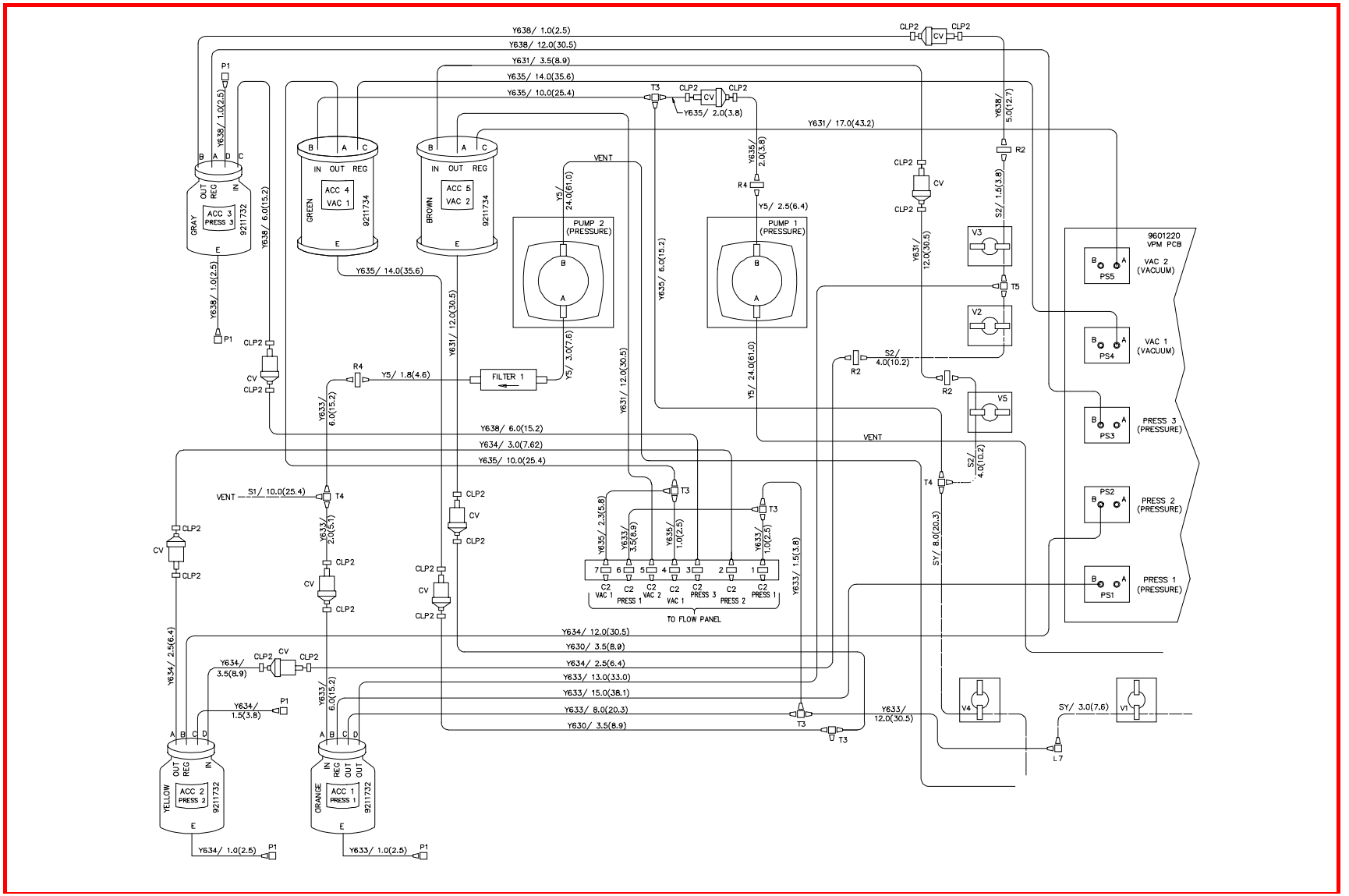
PL-19 Covers (3 of 3)

Item	Part #	Description
1	8931213001	Cover, SL Bottom
2	8932063701	Cover, SL Top Skirt
3	8932073701	Cover, SL Right Side Front
4	8932073801	Cover, SL Left Side Front
5	8921217001	Cover, Front Nose Section
6	8913007601	Kit, Hardware, 3200
7	8931204801	Cover, Left Side
8	8913007601	Kit, Hardware, 3200
9	8931204601	Cover, Top
10	8931204701	Cover, Right Side
11	8932062201	Cover, Right Front Door
12	8370830101	Sensor, Photodiode & LED
13	8952078001	Cable, Nose Cover Sensor
17	8932062101	Cover, Left Front Door
18	8510810901	Switch, Touch Bar
19	8952083801	Cable, FCM-J7 to SAB-J1
20	8960192001	Bd, Status Alert

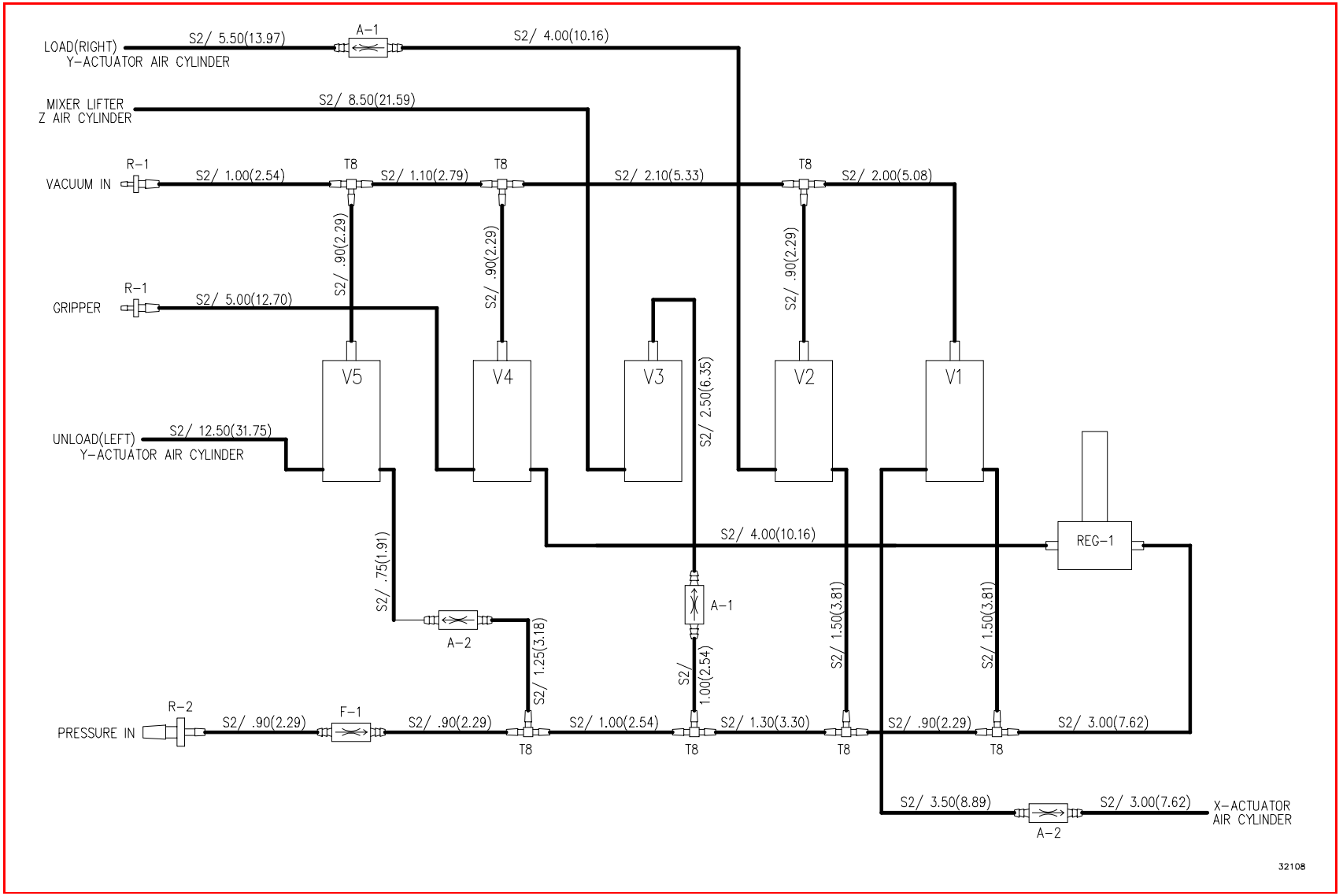
Flow Panel


VENT
PERISTALTIC PUMP
DIL
SHEATH
WBC
RBC
HGB
W1
W3
D4
D5
WC-4
WC-2
PRESS 3
VAC 1
PRESS 2
DILUENT
WASTE
DILUENT
PRESS 1
VAC 1
DILUENT
WASTE
VAC 2
PRESS 1
SYRINGES: 1 2 3 4
Y FITTING
TO AIR SUPPLY VAC/VAC2 DRAIN
TO AIR SUPPLY VBACK PANEL
32106

Pneumatic Unit



Sample Loader



Tubing Designator/Catalog Number Table

Item	Part #	Description
A1	8310817501	Fitting RSTR .016” X 1/16”
A2	8310817401	Fitting RSTR .010” X 1/16”
C	8310808401	Fitting Conn 0.093 X 0.093
C1	8310802001	Fitting Barb Conn 0.062" X 0.062"
CLP2	8210050201	Clamp, Tubing 1/4 O.D.
CV	8310810201	Valve, Check, Duckbill
EL	8310820001	Fitting Elb 0.093 X 0.093
F1	8270722201	Filter, 5 Micron, In-line
L1	8310807901	Fitting Elb 0.062" X 0.062" X 0.062"
L7	8310805801	Fitting, L, 1/8 in x 1/8 in
P1	03H85-01	Plug
R1	8310805901	Fitting Barb RDCR 0.093" X 0.062"
R2	8310800101	Fitting Barb RDCR 0.125" X 0.062"
R3	8310806201	Fitting Barb RDCR 0.125" X 0.093"
R4	8310807401	Fitting, Reducer, 3/16 in to 1/8 in
S1	9130542	Tubing, Silicon 1/32 ID x 5/32 OD
S2	9130543	Tubing Silicon (S2)
SY	9130544	Tubing Silicon (SY)
T1	8310801001	Fitting T 0.062" X 0.062" X 0.062"
T3	8310800901	Fitting T 0.125" X 0.125" X 0.125"
T4	31082-01	Fitting (T4)
T5	8310809501	Fitting T 0.062" X 0.125" X 0.062"
T8	8310800701	Fitting T 0.093 X 0.093 X 0.093

Item	Part #	Description
Y1	9130548	Tubing Tygon®, 1/16” ID
Y2	9130549	Tubing Tygon®, 1/8” ID
Y3	8310654201	Tubing Tygon® 3/32”
Y4	9130555	Tubing Tygon® 1/32” ID 3/32 OD
Y5	8310654001	Tubing Tygon® 3/16” ID 5/16” OD Clr
Y622	8310662201	Tubing Tygon® 0.062" ID 0.125" OD Red
Y626	8310662601	Tubing Tygon® 0.062”
Y627	8310662701	Tubing Tygon® 0.062" ID 0.125" OD Pur
Y630	8310663001	Tubing Tygon® 0.125" ID 0.250" OD Blk
Y631	8310663101	Tubing Tygon® 0.125 ID 0.250 OD Grn
Y632	8310663201	Tubing Tygon® 0.125" ID 0.250" OD Red
Y633	8310663301	Tubing Tygon® 0.125" ID 0.250" OD Or
Y634	8310663401	Tubing Tygon® 0.125 “ID 0.250” OD Yel
Y635	8310663501	Tubing Tygon® 0.125" ID 0.250" OD Grn
Y636	8310663601	Tubing Tygon® 0.125” ID 0.250 OD Blu
Y637	8310663701	Tubing Tygon® 0.125" ID 0.250" 0D Pur
Y638	8310663801	Tubing Tygon® O.125” ID 0.250” OD Gry
Y7	8310653501	Tubing Tygon® 3/32”
Y FIT	8310810801	Fitting 0.062” X 0.062” X 0.062”

4 - Removal & Replacement

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Introduction

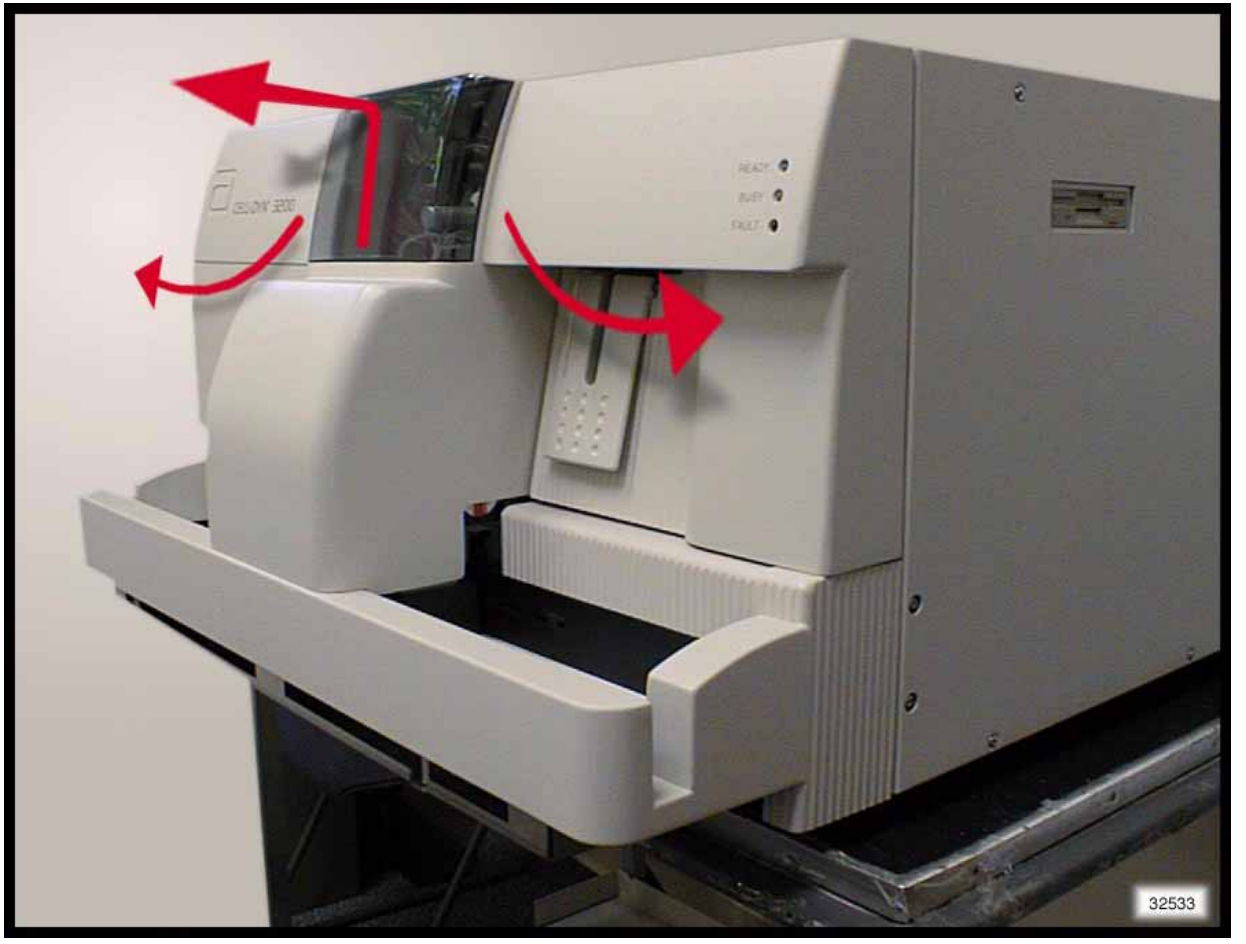
Step-by-step subassembly removal procedures for field replaceable components are described on the following illustrated pages. Most subassemblies are replaced in reverse order of disassembly, and reassembly is obvious and straightforward.

Shear Valve & Shear Valve Driver (RR-1)

Removal Procedure

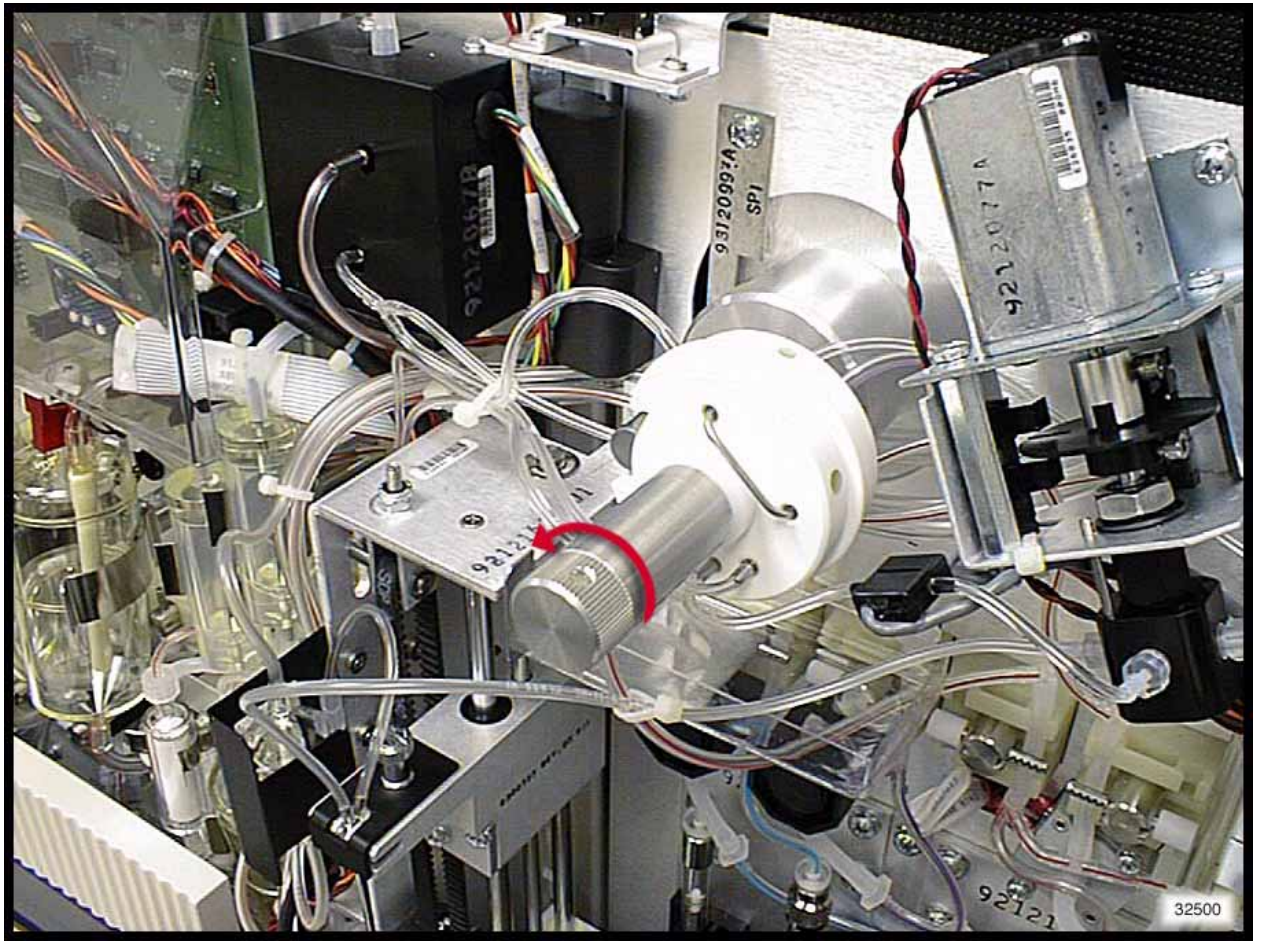
1. Ensure that the shear valve is in the cleaning position using the special protocols function.
2. With analyzer power off, open the left and right access doors and remove the safety cover.

Figure 4-1: Front Access Doors



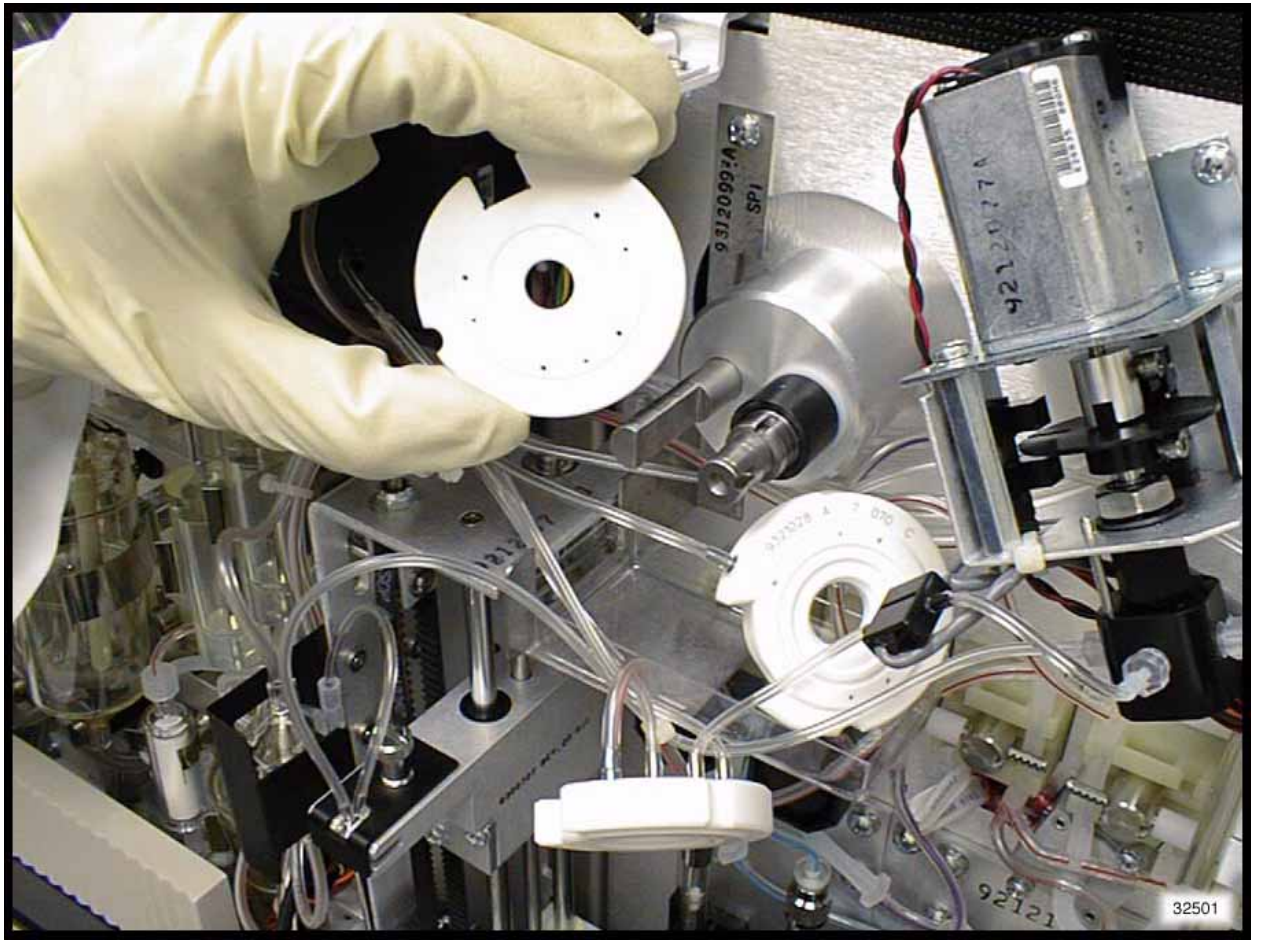
3. Remove the shear valve retaining screw from the center of the shear valve.

Figure 4-2: Shear Valve Retaining Screw



4. Carefully remove the three ceramic pieces from the shear valve. Set the fragile center piece aside. Do not disconnect tubing from the other two pieces.

Figure 4-3: ***Shear Valve Ceramics.***

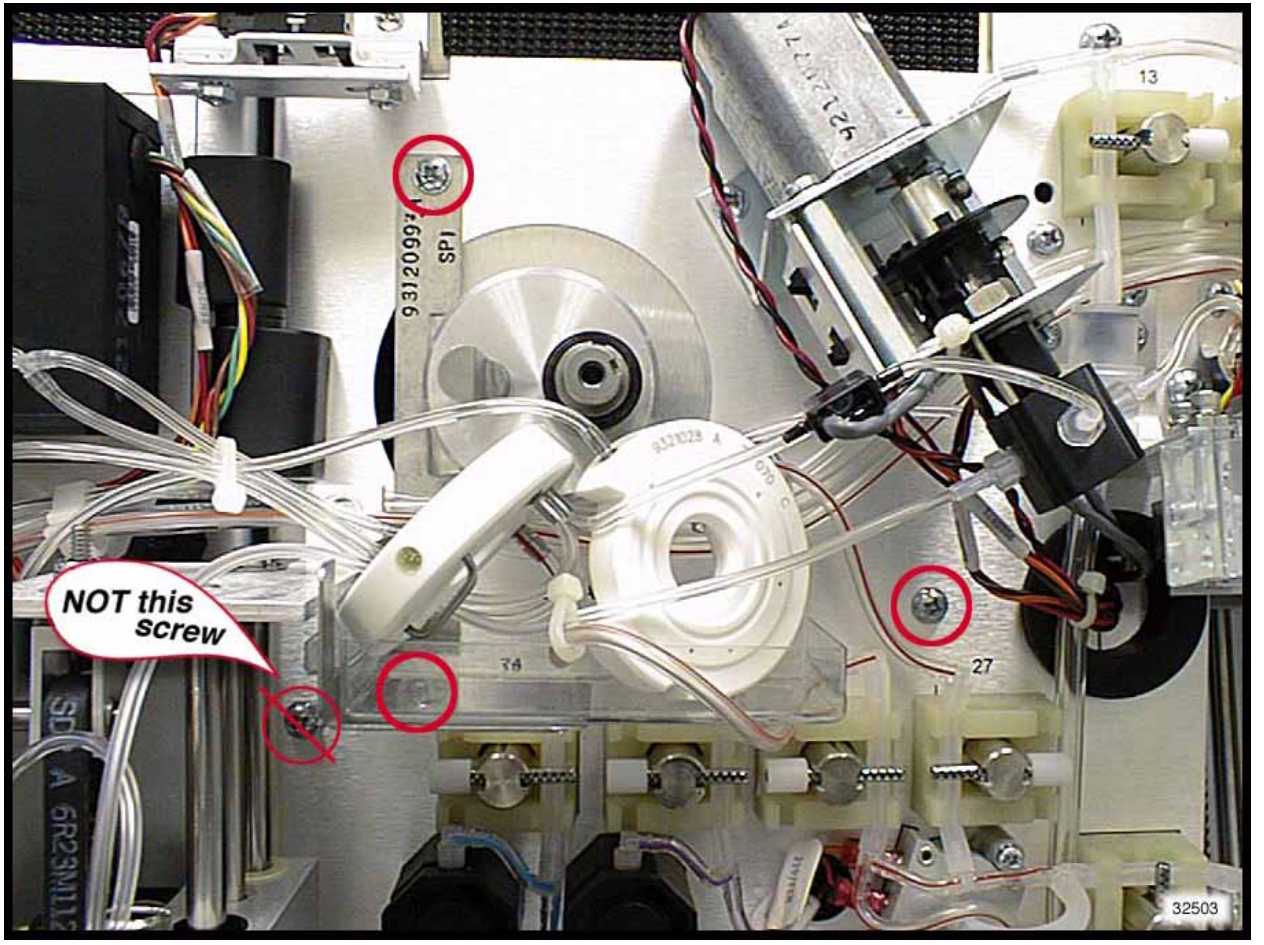


5. Remove the top cover (4 screws) and the optics cover (two 6-32 screws and two 8-32 screws.)

Figure 4-4: ***Removing Top Cover and Optics Cover***

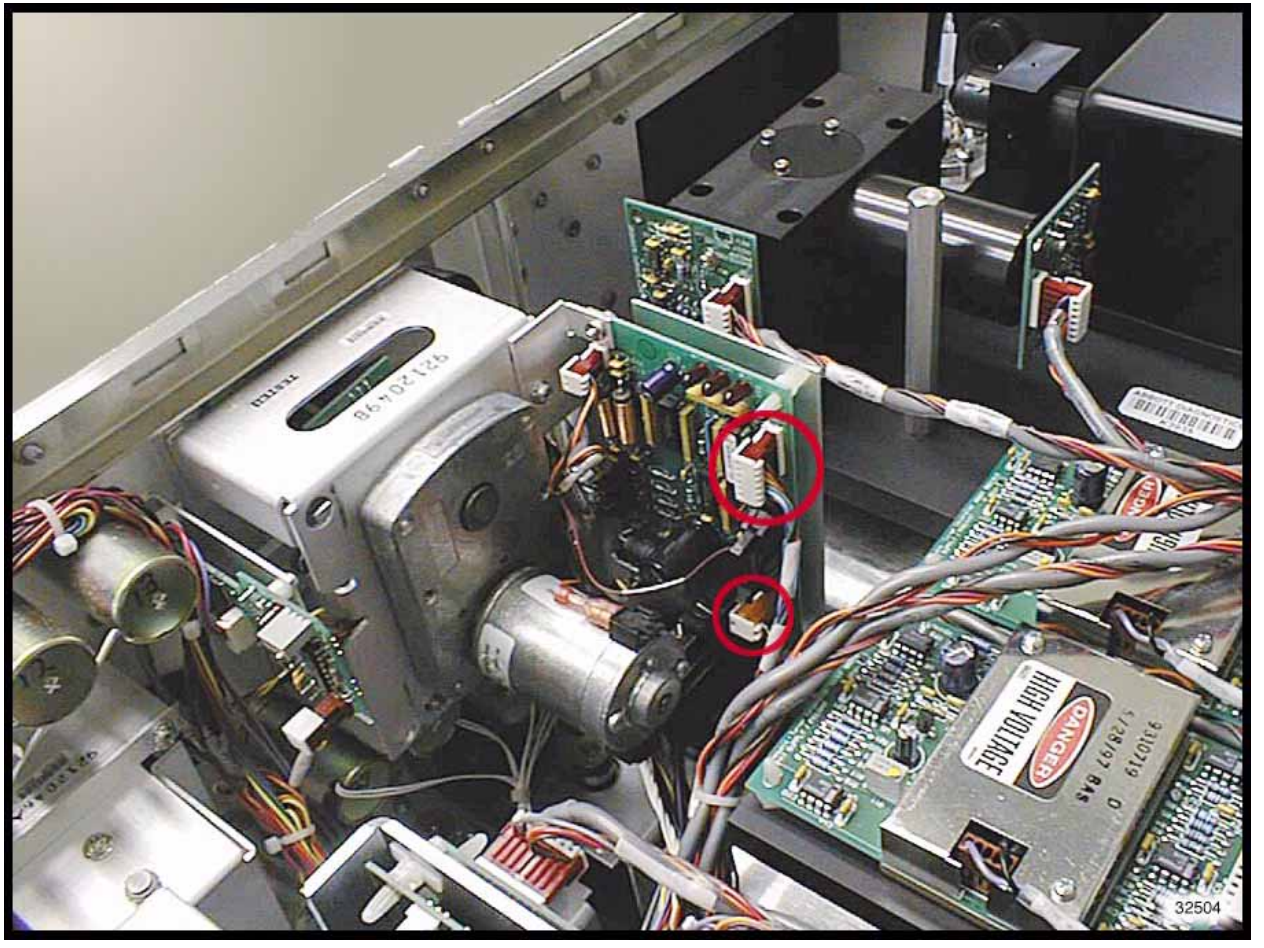
6. Remove the 3 screws that hold the assembly in place.

Figure 4-5: ***Shear Valve Driver MountingScrews***



7. Move the preamplifier cables out of the way and disconnect cables at J2 and J3 from the Driver Bd.

Figure 4-6: ***Shear Valve Cables J2 and J3.***



8. Angle the assembly and remove from the back

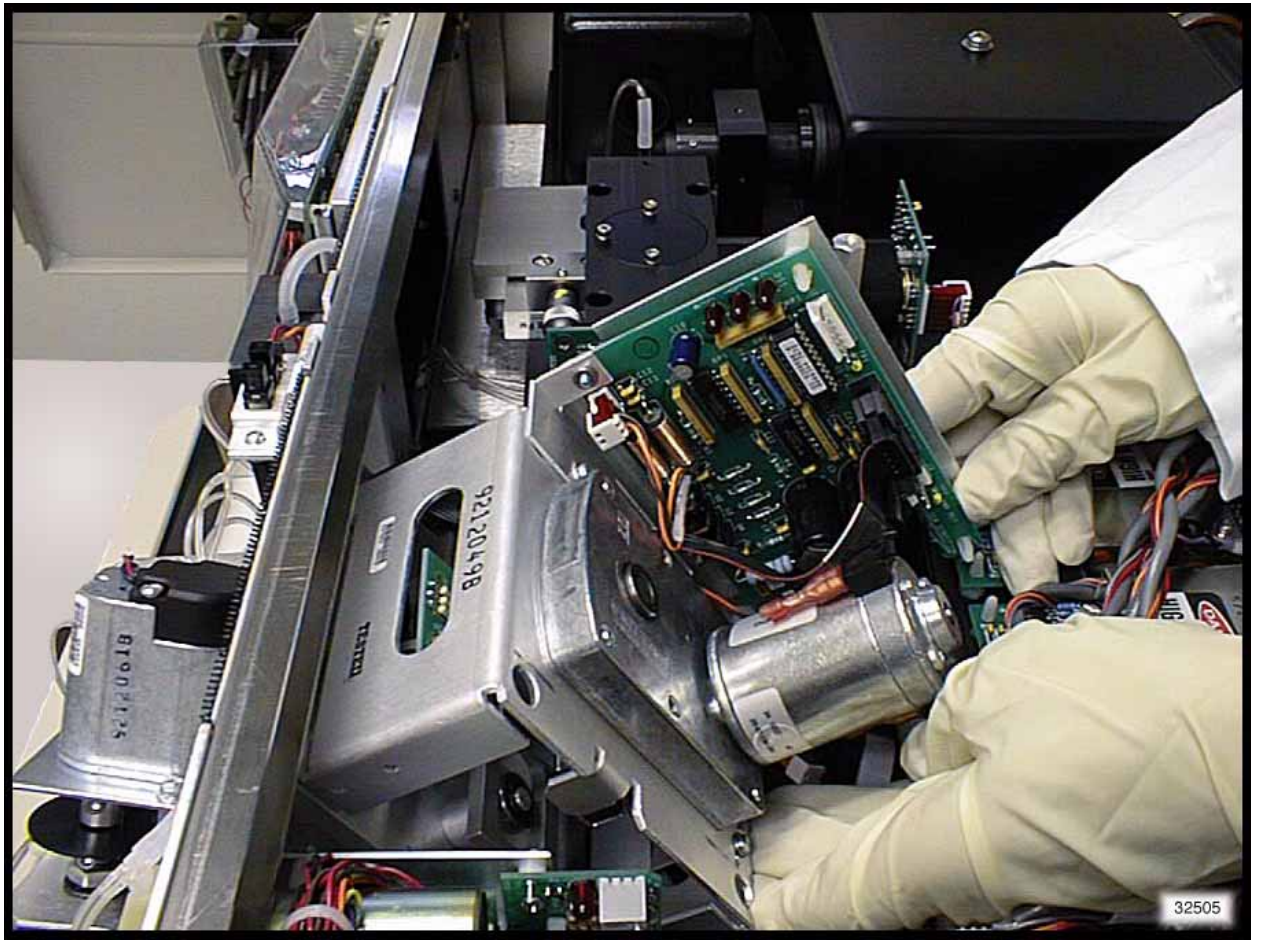
Replacement Procedure

Replace by following the steps above in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-7: ***Shear Valve & Shear Valve Driver Removed.***

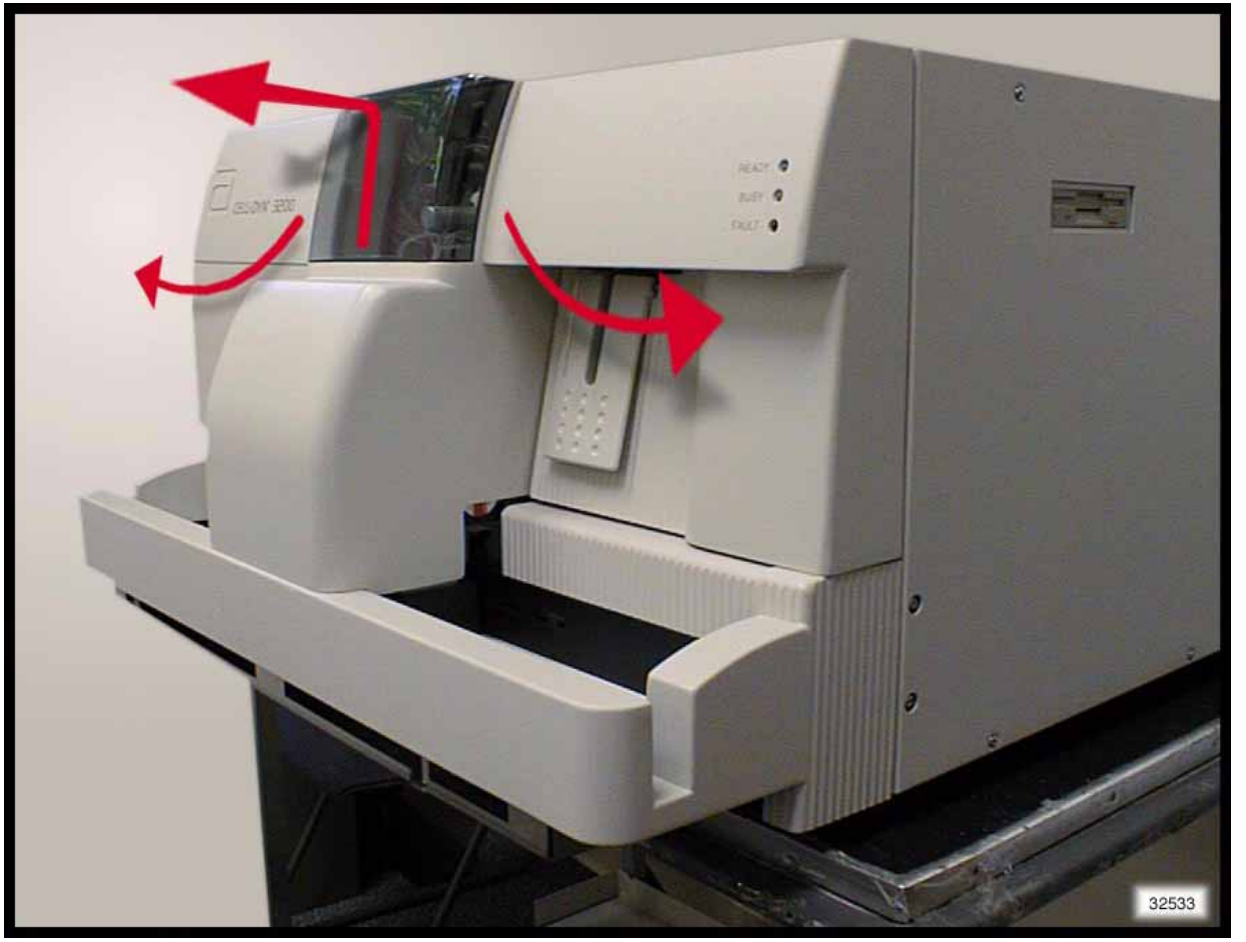


Y-Valve (RR-2)

Removal Procedure

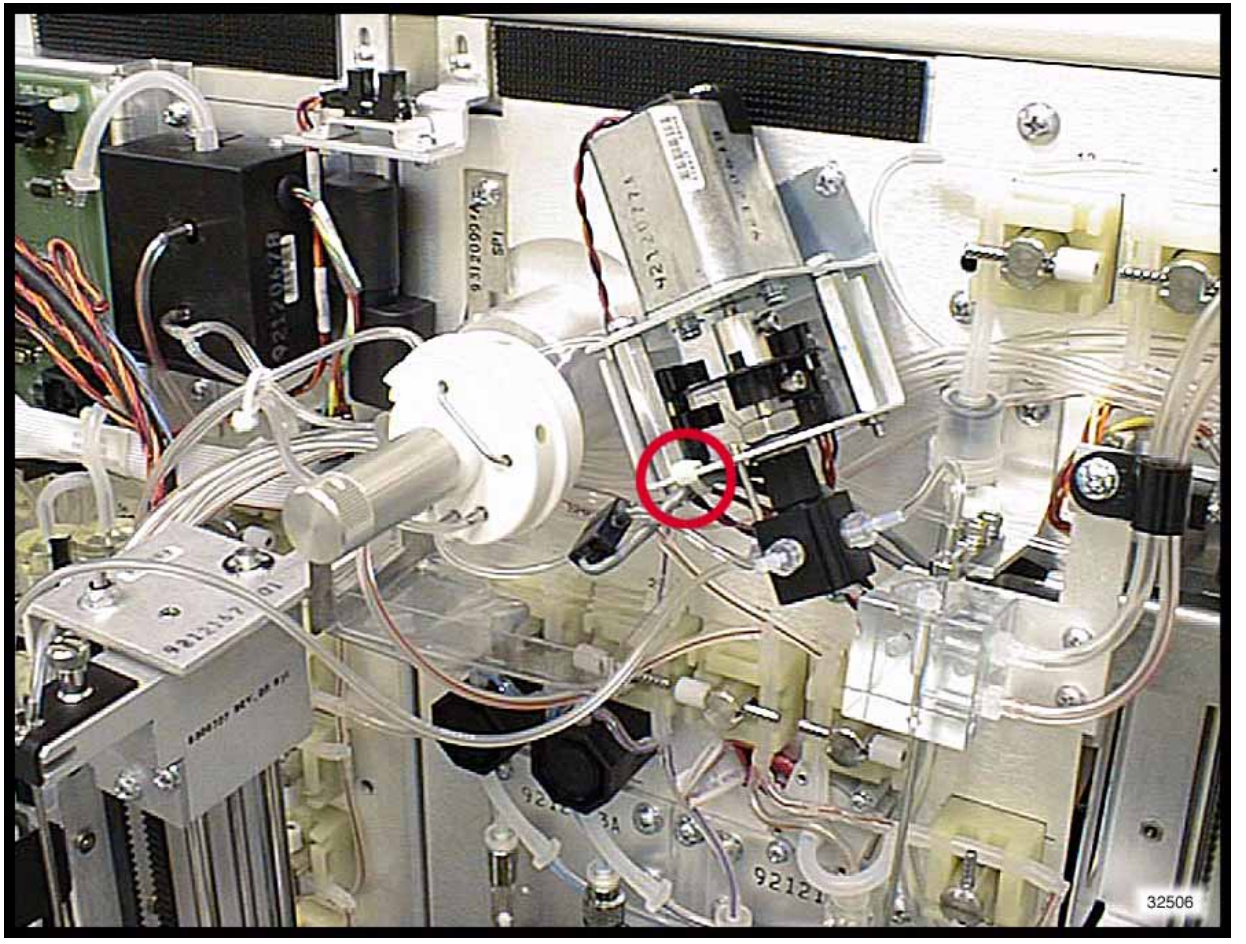
1. With analyzer power off, open the left and right access doors and remove the front cover.

Figure 4-8: ***Front Access Doors***



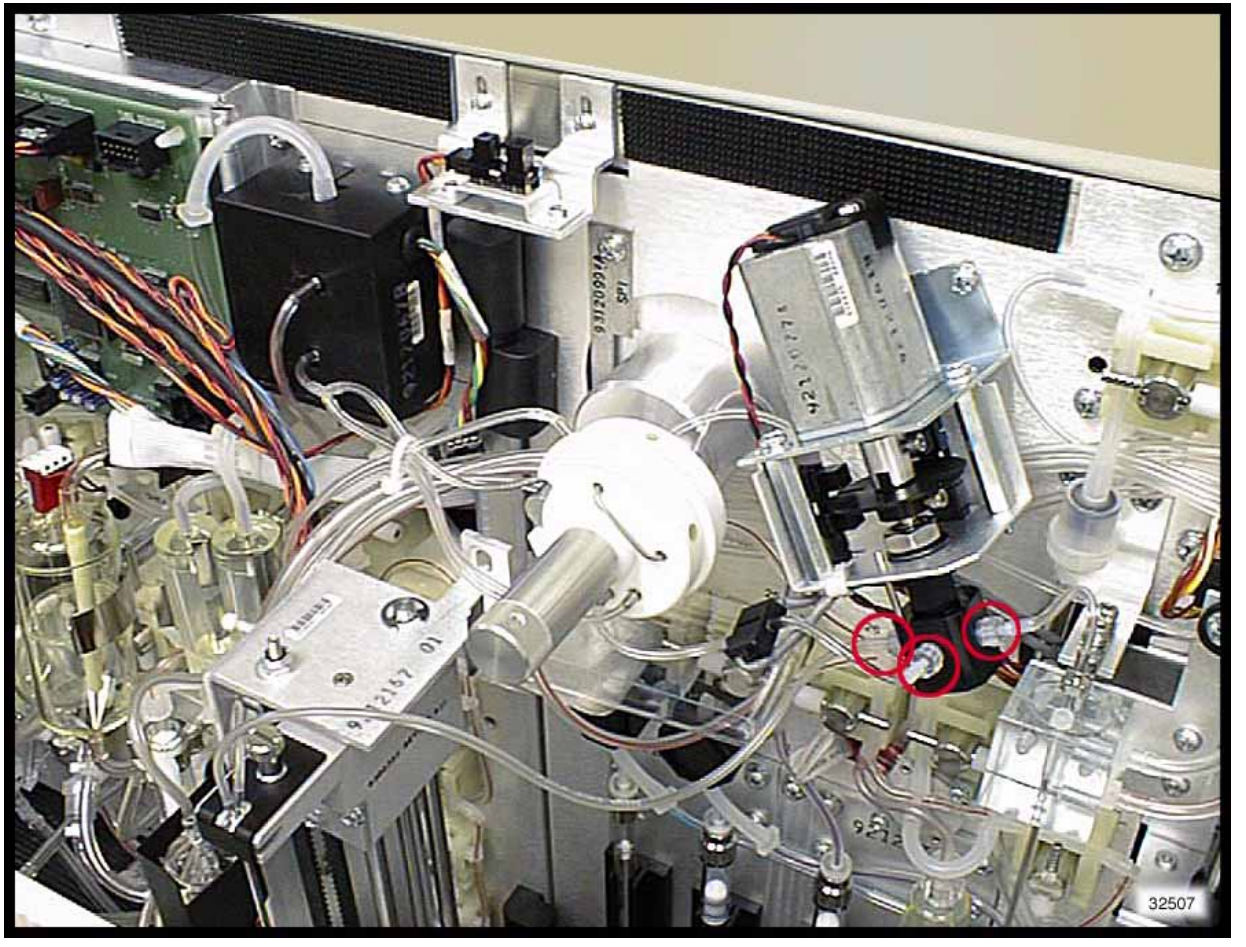
2. Locate the Y-valve assembly and cut the tie wrap on the lower left-hand corner.

Figure 4-9: ***Y-Valve Tie Wrap***



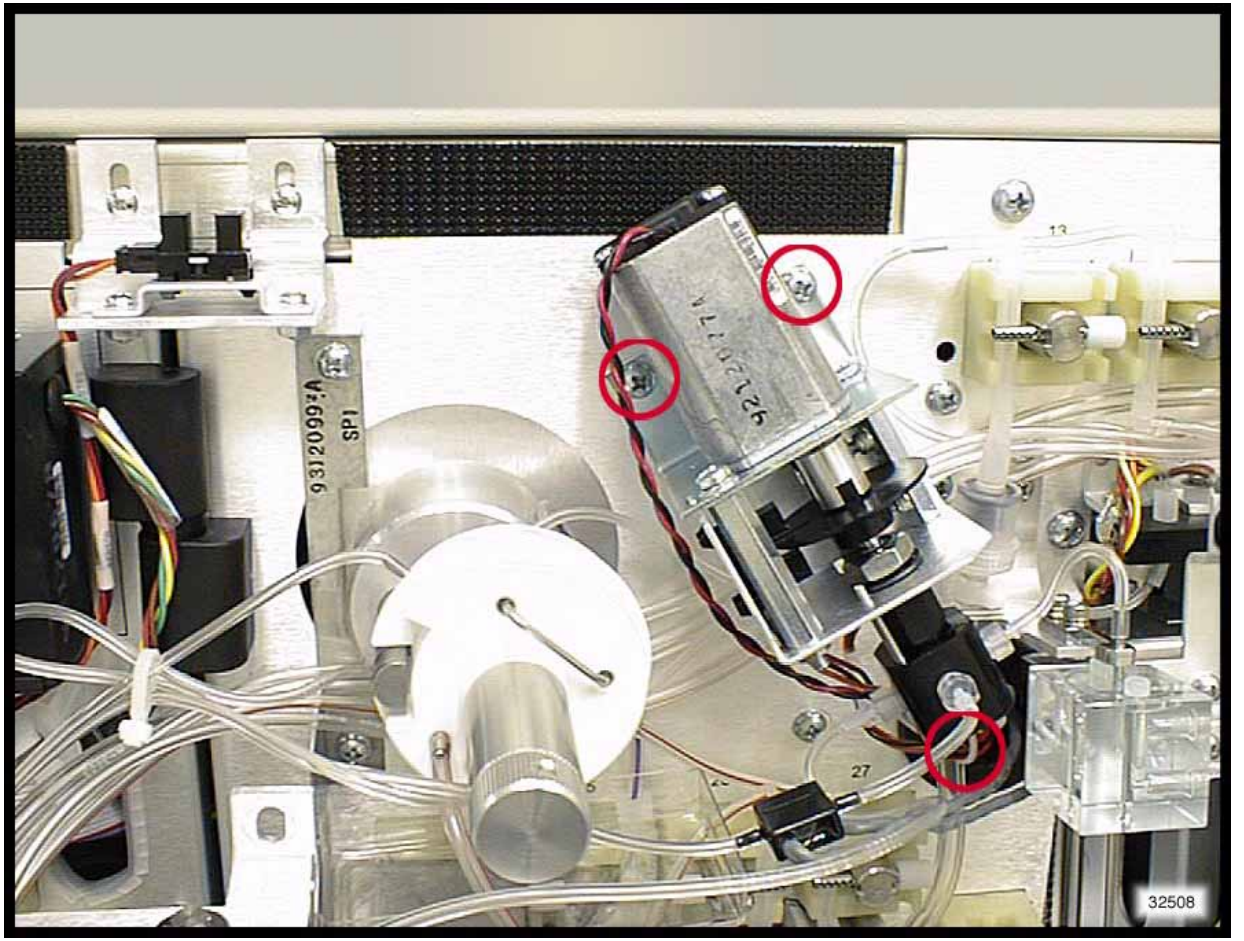
3. Disconnect the tubing from the three ports on the valve block

Figure 4-10: ***Y-Valve Block Tubing***



4. Remove the two screws at the top near the motor and cut the tie wrap to the left of the wash block.

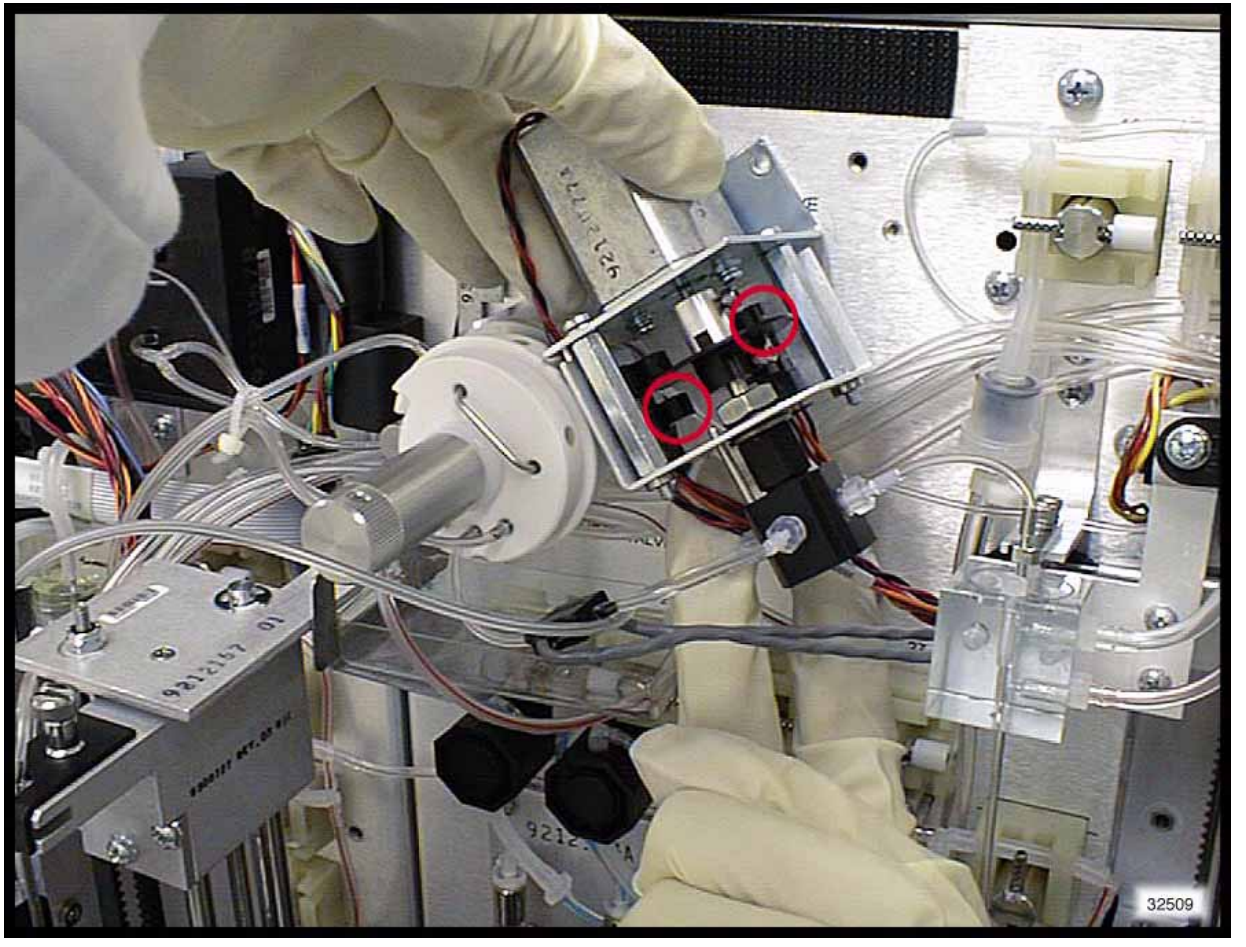
Figure 4-11: ***Y-Valve Mounting Screws***



5. Disconnect the two sensor connections from the base of the assembly.

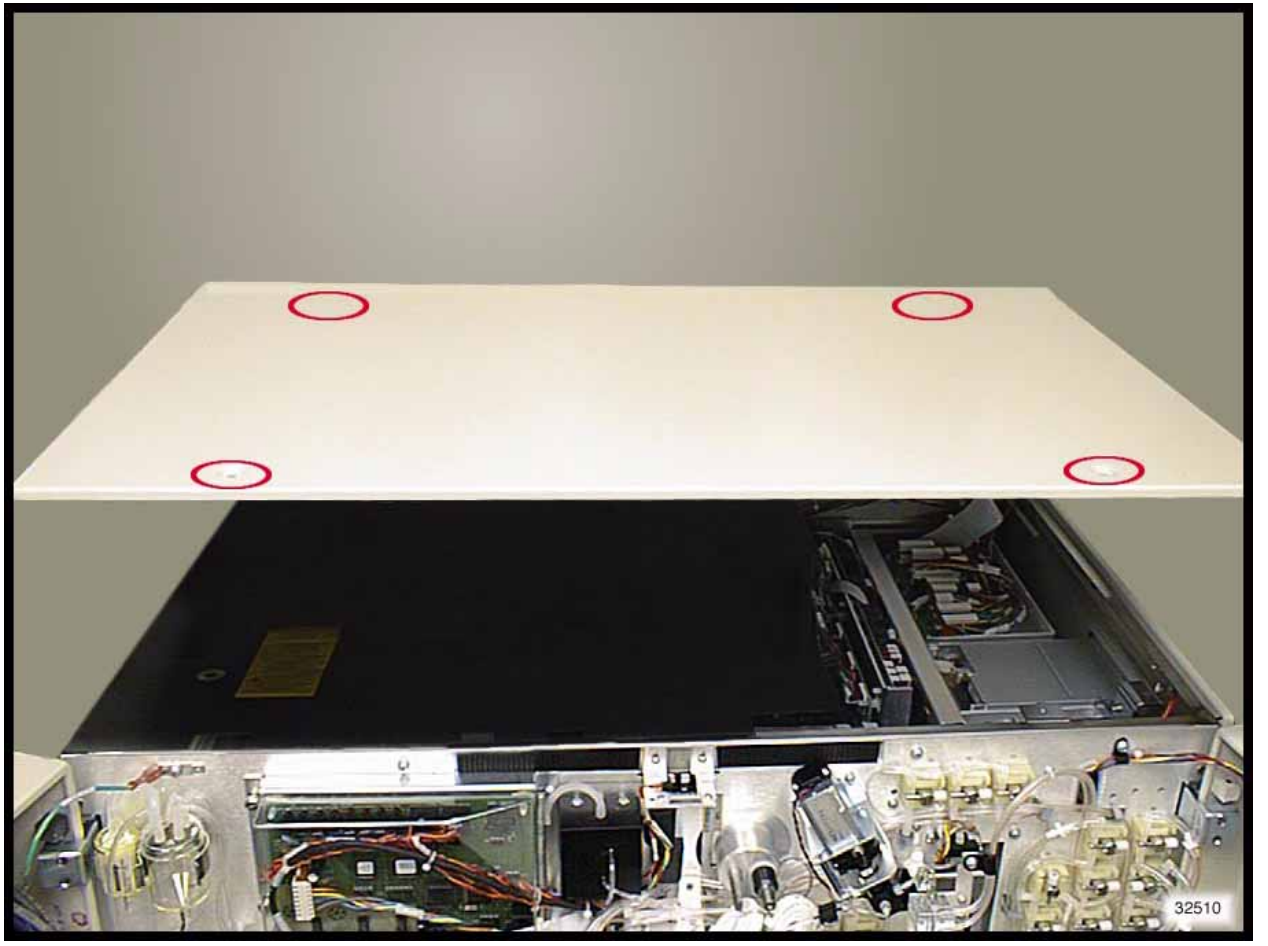
   NOTE: For replacement purposes, note which socket each comes from as they are not identified.

Figure 4-12: ***Y-Valve Sensor Connections.***



6. Remove the top cover (4 screws).

Figure 4-13: ***Top Cover Removal***



7. Cut the two tie wraps from around the cables above solenoids and the tie wrap beneath solenoid 13. Disconnect cable J6 from the Motor Driver Bd. (located to the left of solenoid 11 in photo.)

   Feed cable through front panel and remove assembly.

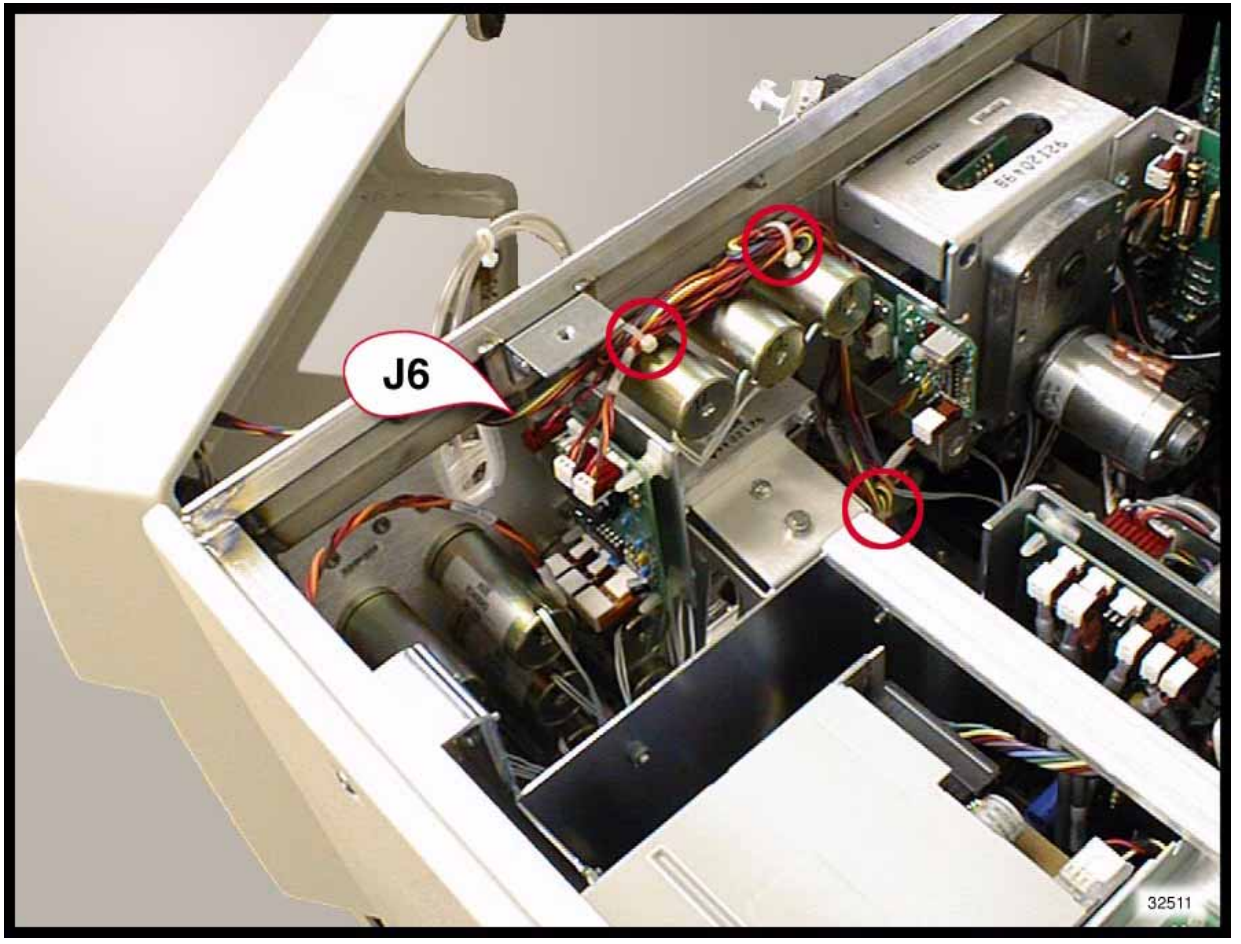
Replacement Procedure

Follow the above steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-14: ***Y-Valve Cable J6***

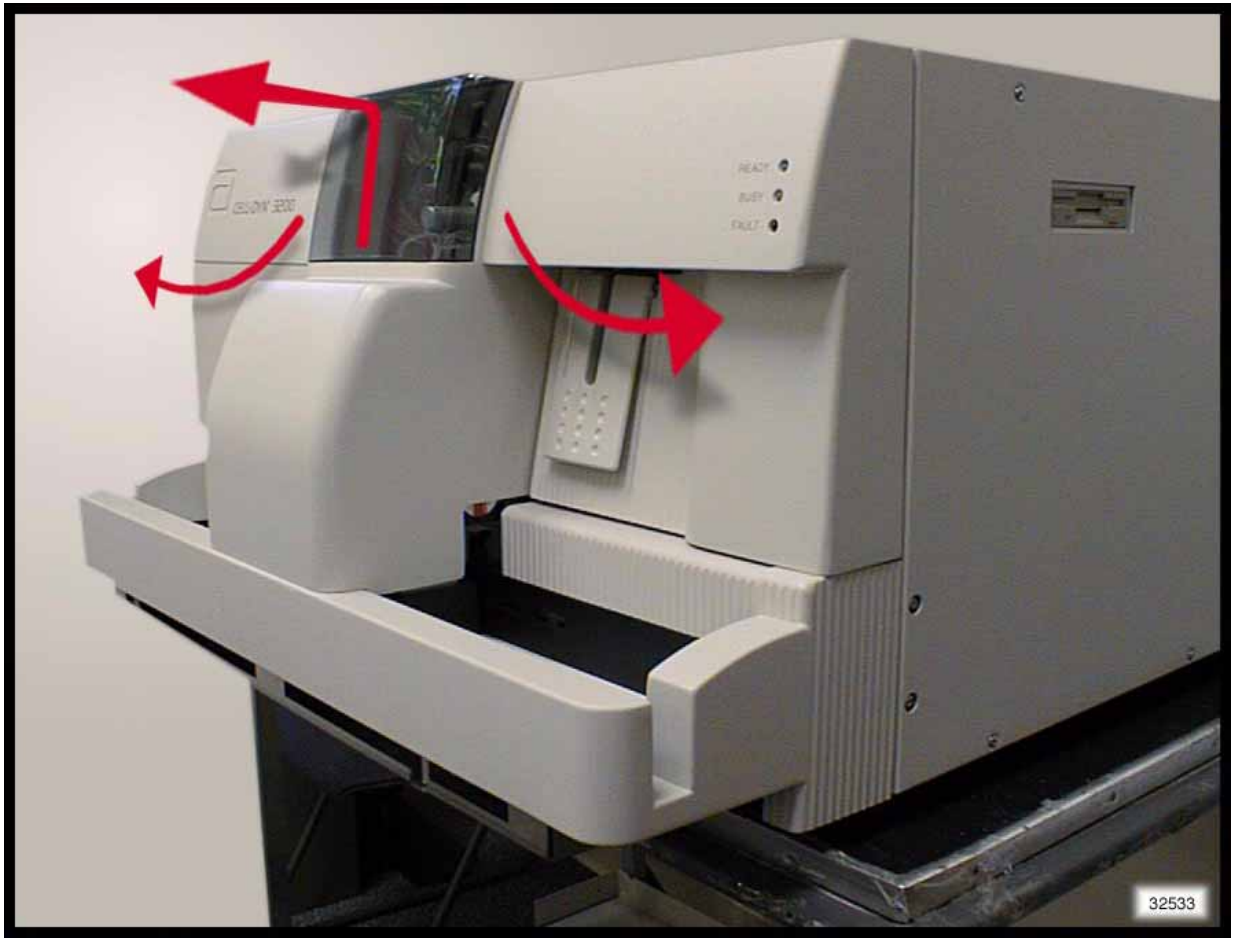


Ultrasonic Sensor (RR-3)

Removal Procedure

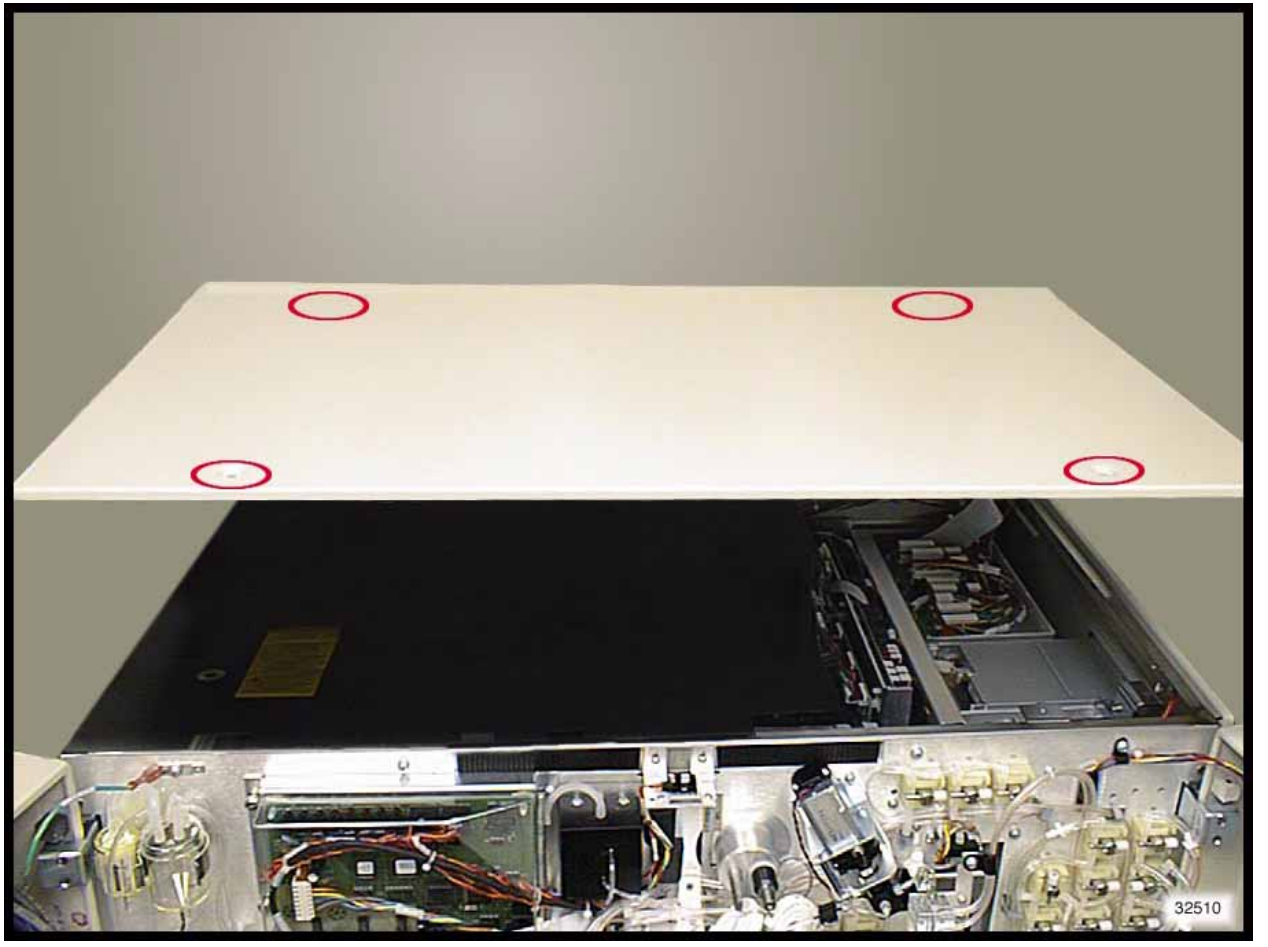
1. With analyzer power off, open the left and right access doors and remove the front cover.

Figure 4-15: ***Front Access Doors***



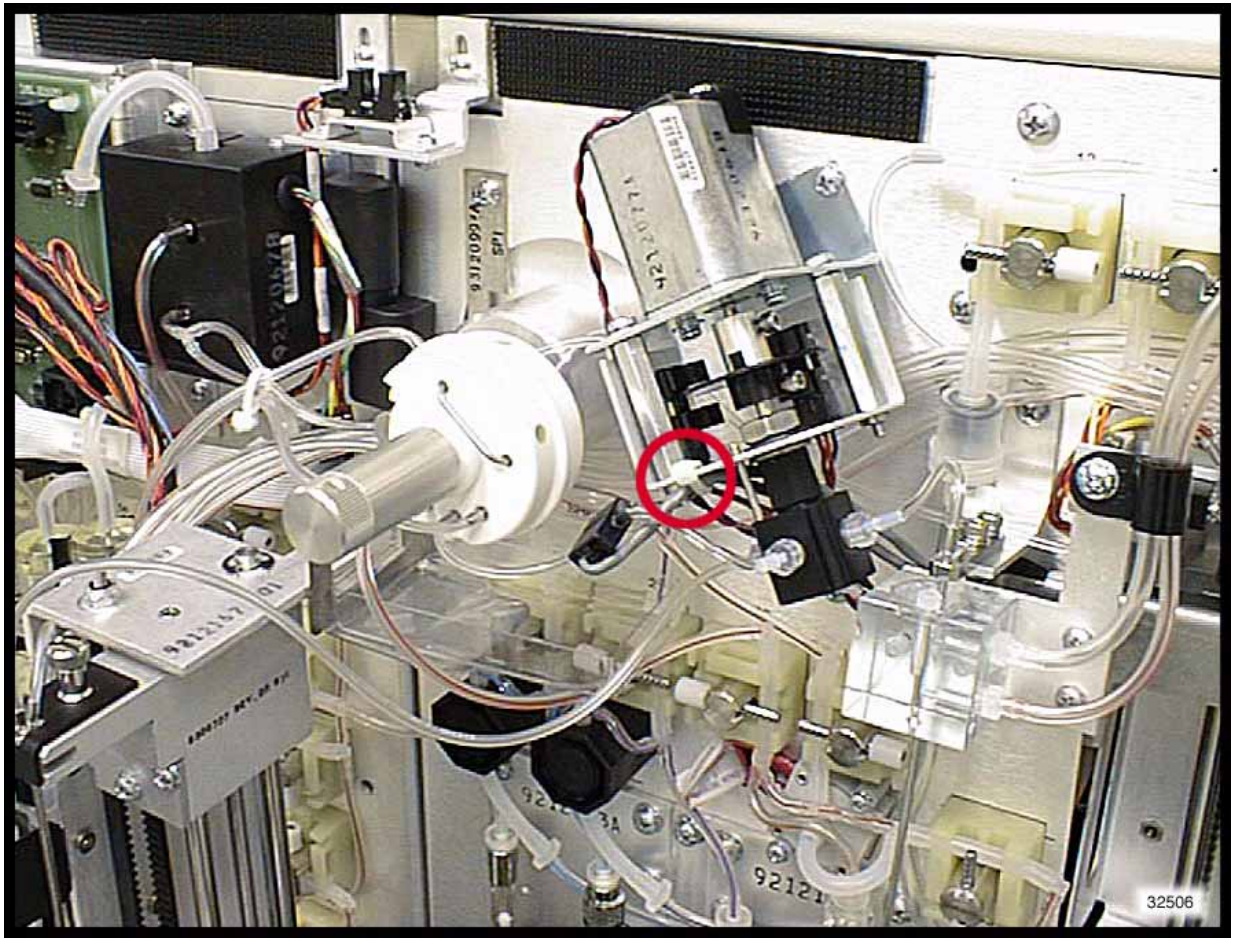
2. Remove the top cover (4 screws.)

Figure 4-16: ***Top Cover Removal***



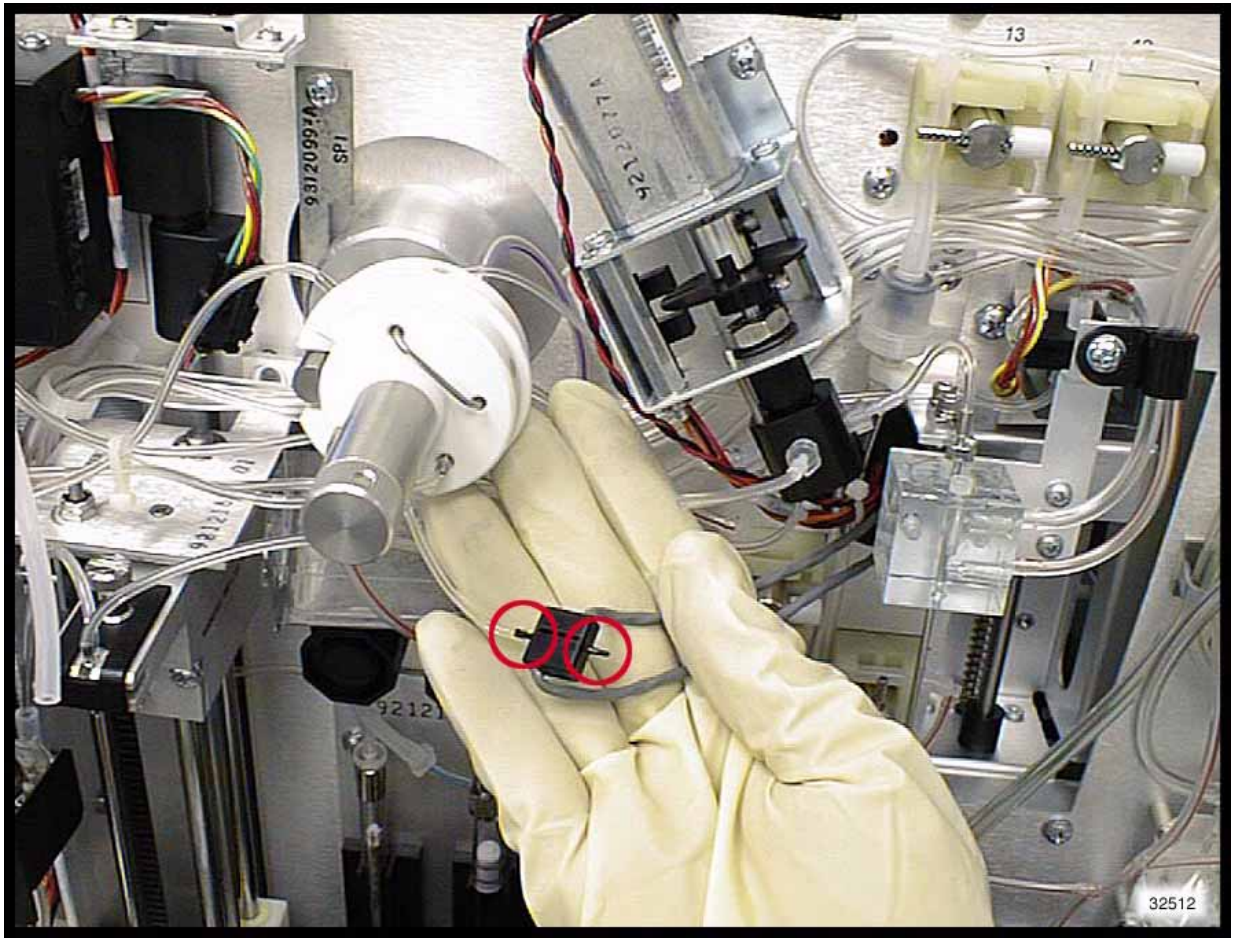
3. Locate the ultrasonic sensor and cut the tie wrap on the Y-valve

Figure 4-17: ***Y-Valve Tie Wrap***



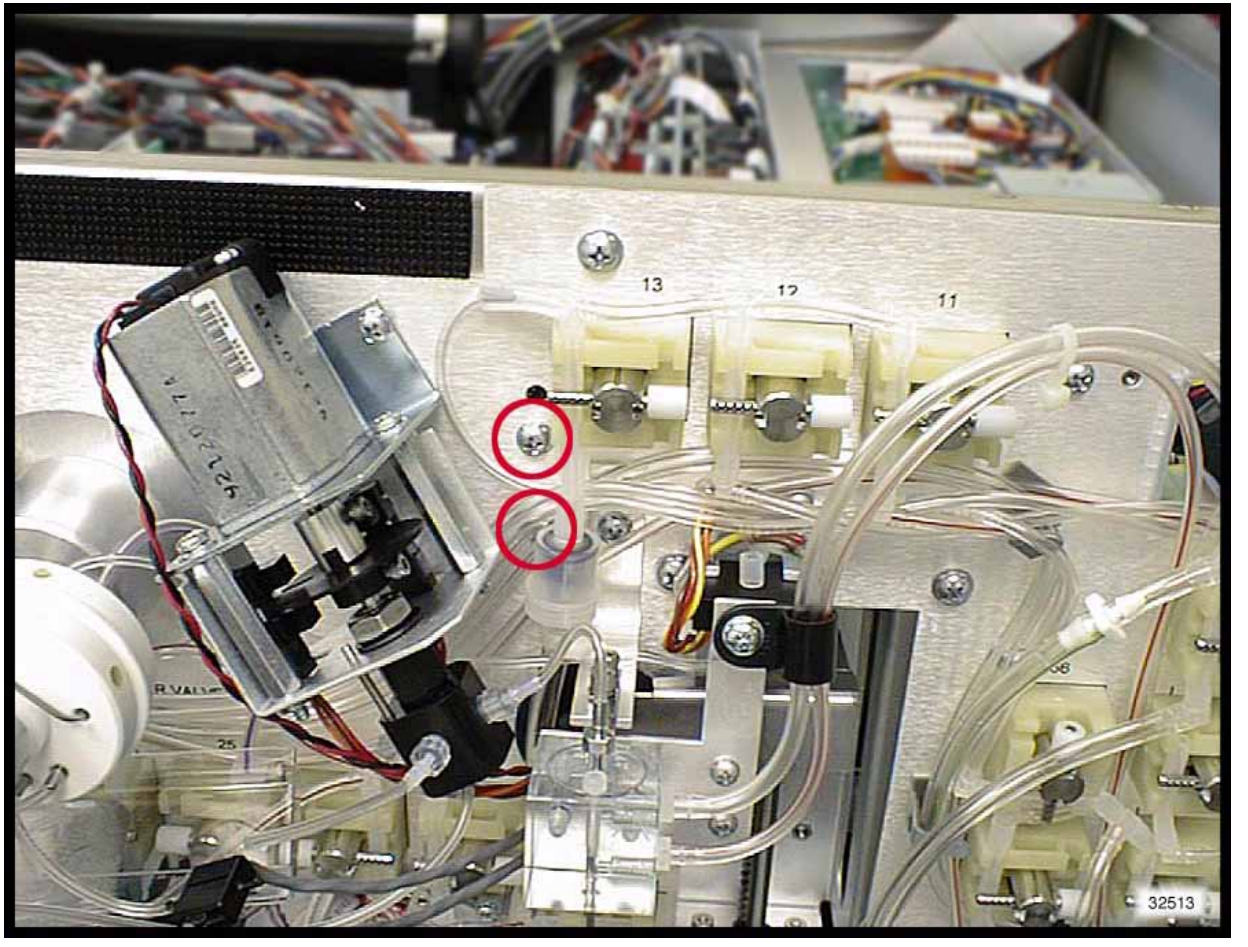
4. Remove the two fluid connections from the left and right of the ultrasonic sensor.

Figure 4-18: ***Ultrasonic Sensor Fluid Connections***



5. Remove the two screws on the front panel which hold the Sensor Bd. bracket.

Figure 4-19: ***Ultrasonic Sensor Holding Screws***



6. Disconnect the gray wires from J1 on the Sensor Bd and feed connector through front panel.

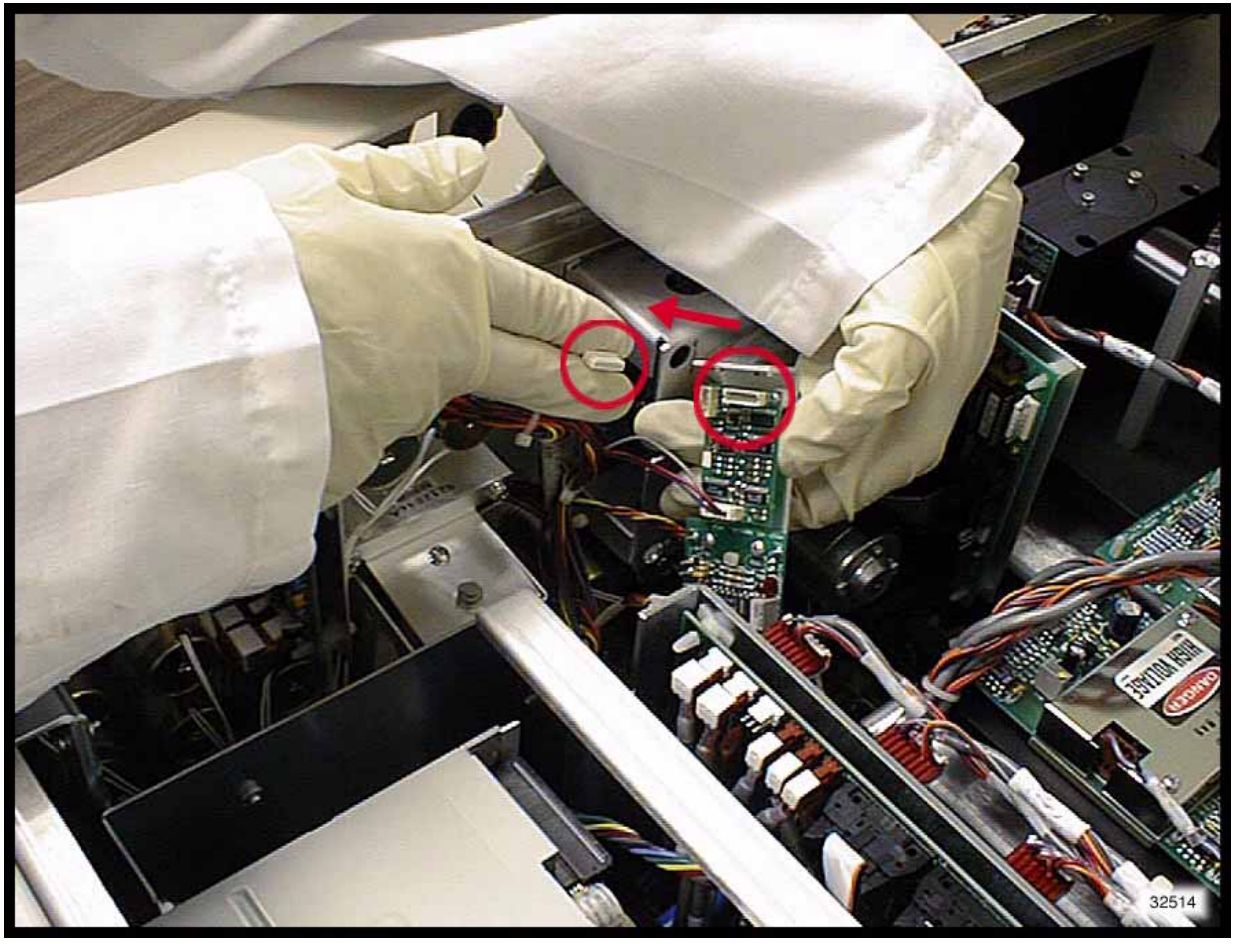
Replacement Procedure

Follow the above steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-20: ***Ultrasonic Sensor Board Connectors***



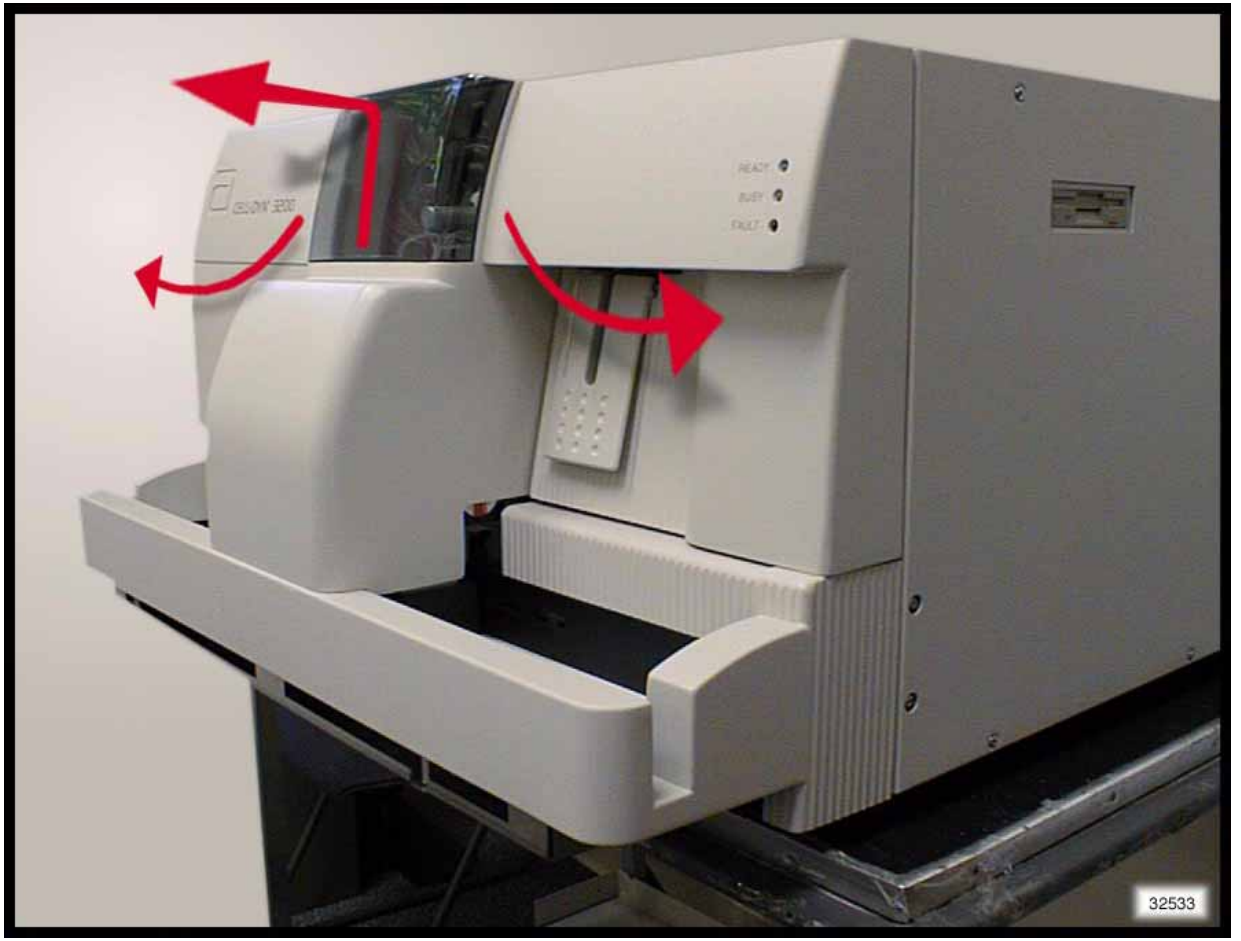
Open Probe Drive Assembly (RR-4)

Removal Procedure

Warning Potential Biohazard: The aspiration needle/probe is sharp and potentially contaminated with infectious materials. Avoid contact with the tips of the needle/probe.

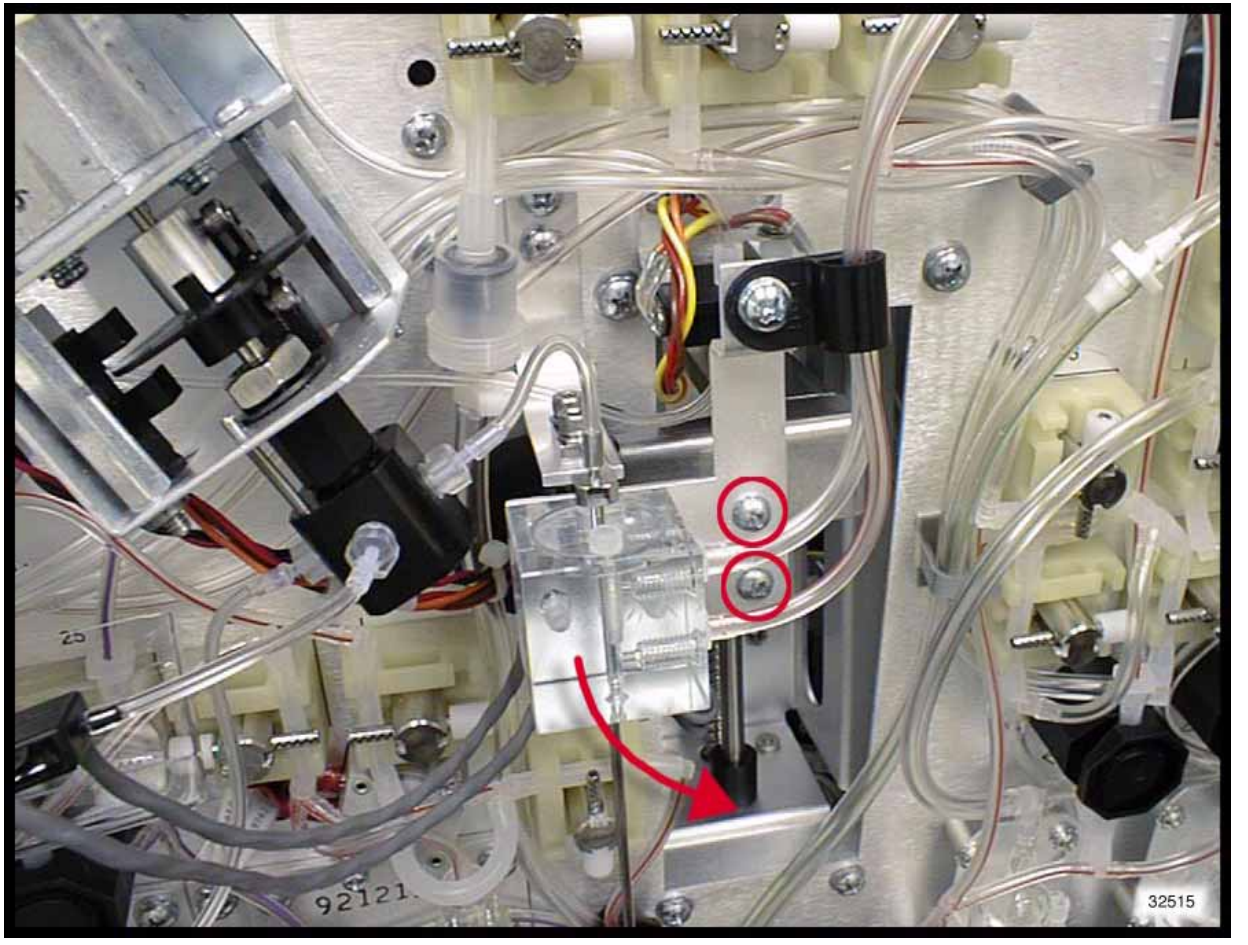
1. With analyzer power off, open the left and right access doors and remove the front cover.

Figure 4-21: ***Front Access Doors***



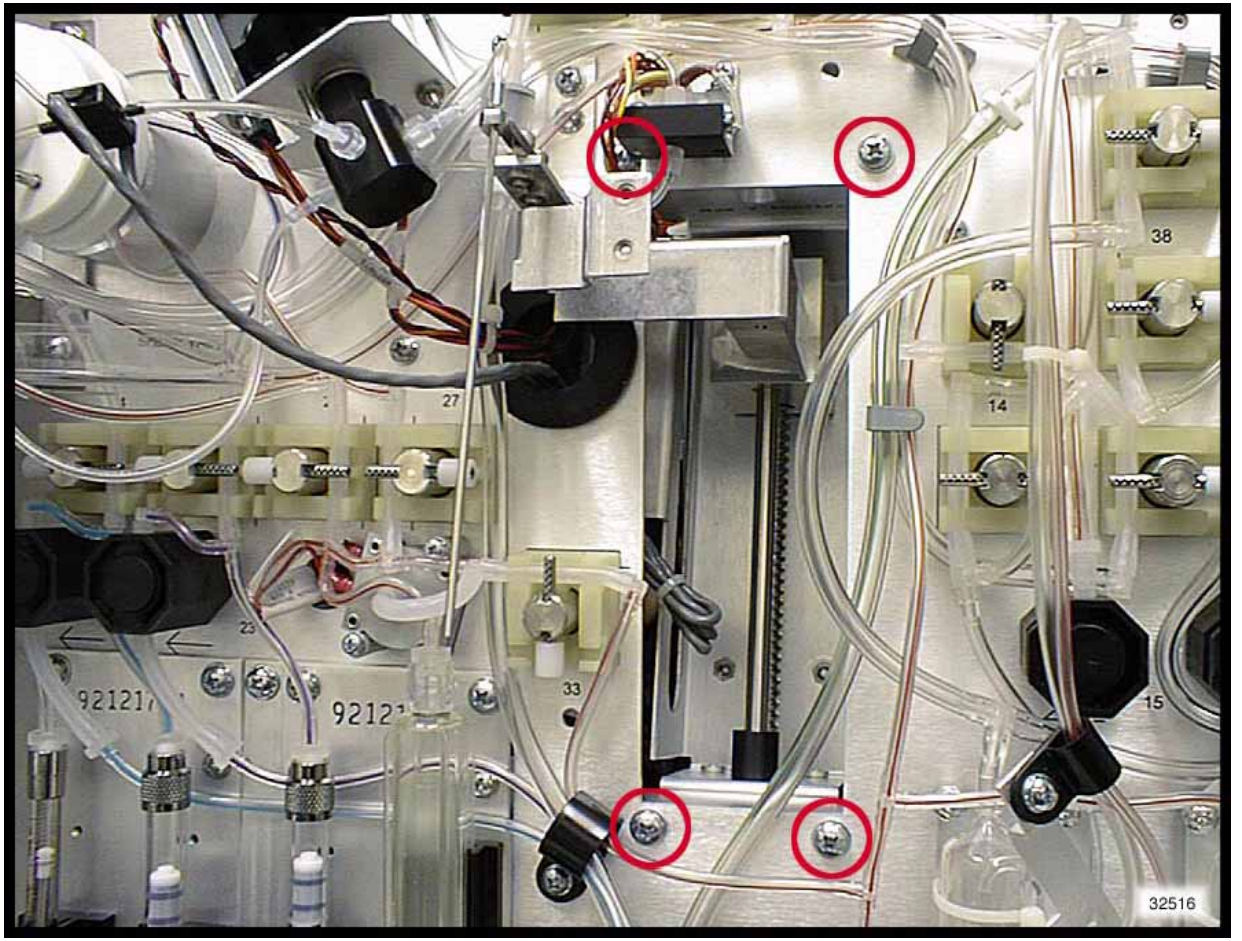
2. Locate and remove the two screws holding the wash block to the open probe assembly and let the wash block dangle.

Figure 4-22: ***Wash Block Holding Screws***



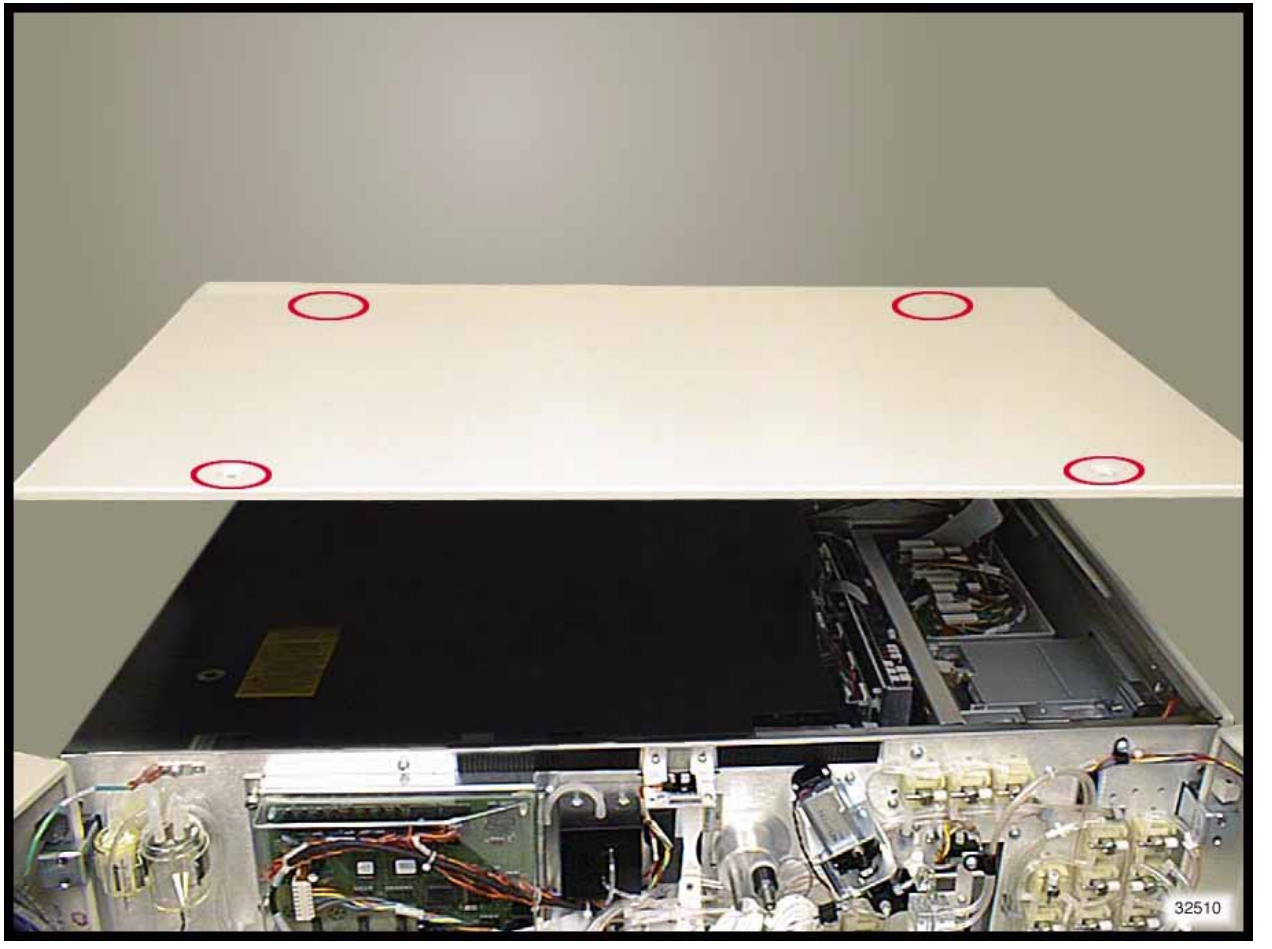
3. Remove the 4 screws holding the assembly to the front panel.

Figure 4-23: ***Open Probe Assembly Mounting Screws***



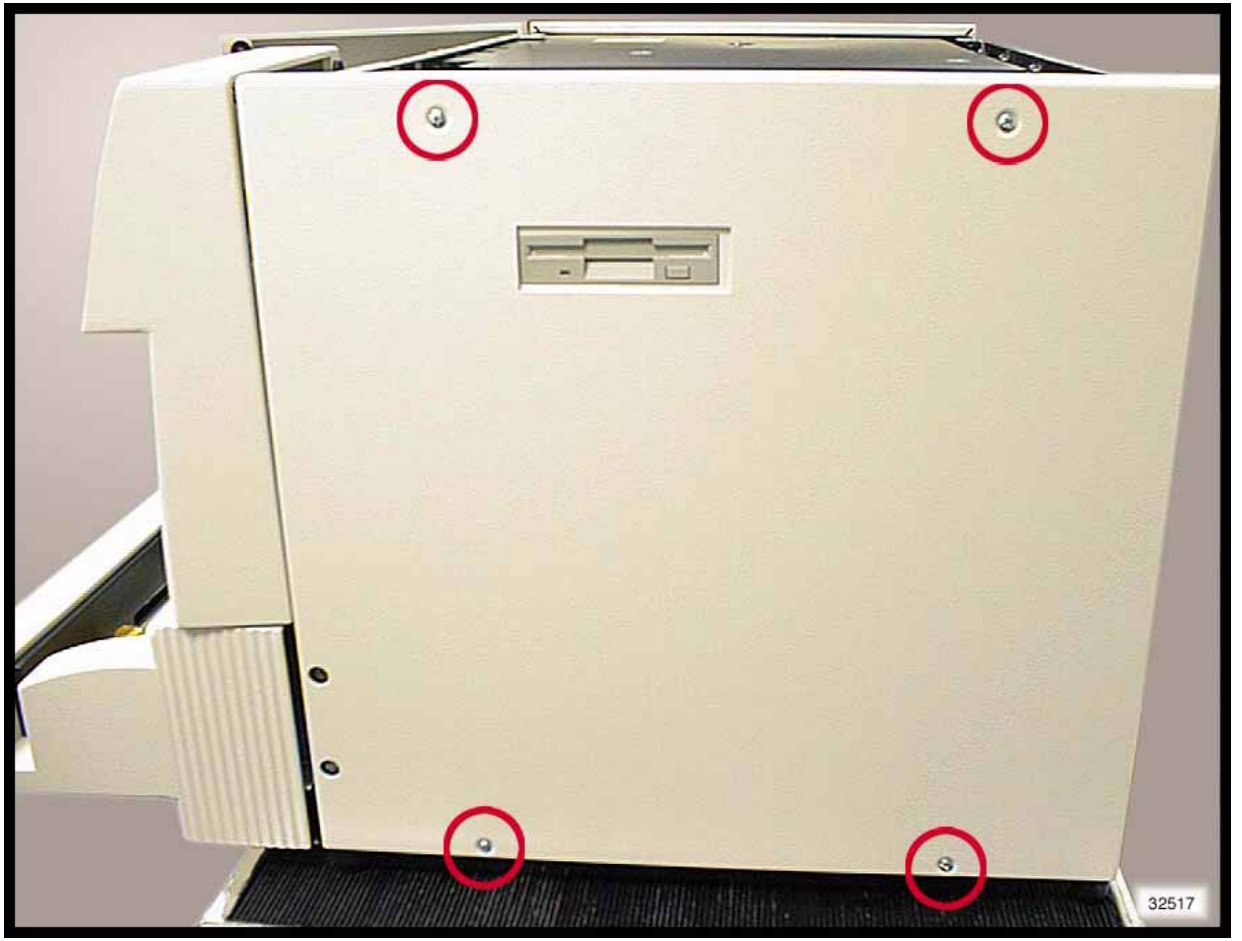
4. Remove the top cover (4 screws).

Figure 4-24: ***Top Cover Removal***



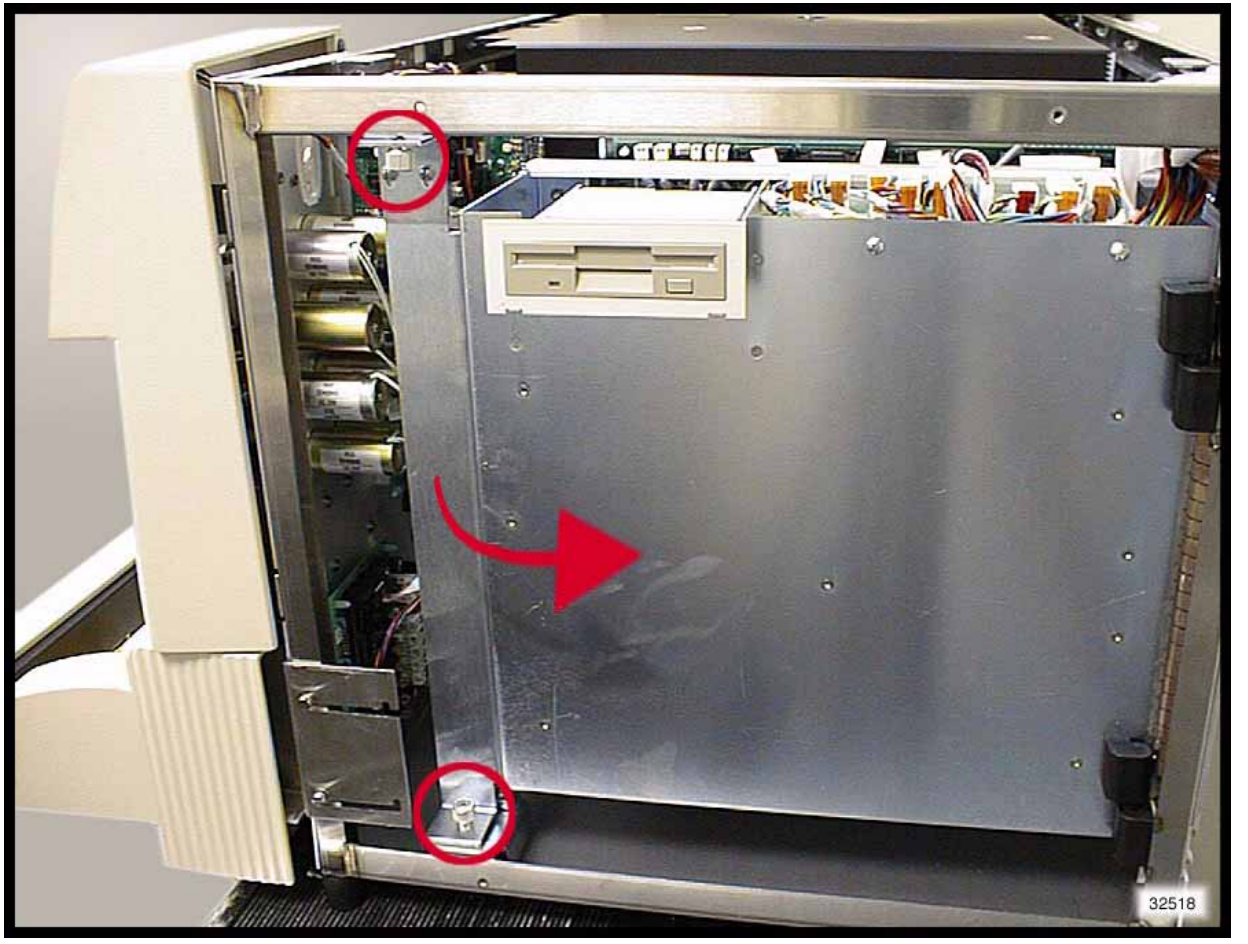
5. Remove the right side cover (4 screws).

Figure 4-25: ***Right Side Cover Removal***



6. Loosen the upper and lower thumbscrews and open the CPU door assembly to gain access to the back of the aspiration assembly.

Figure 4-26: ***CPU Door Access***



7. Carefully pull aside the white solenoid wires to remove the drive assembly, twisting it to the right to remove. Disconnect the ribbon cable J1 from the Chopper Driver Bd. and remove the Probe Assembly.

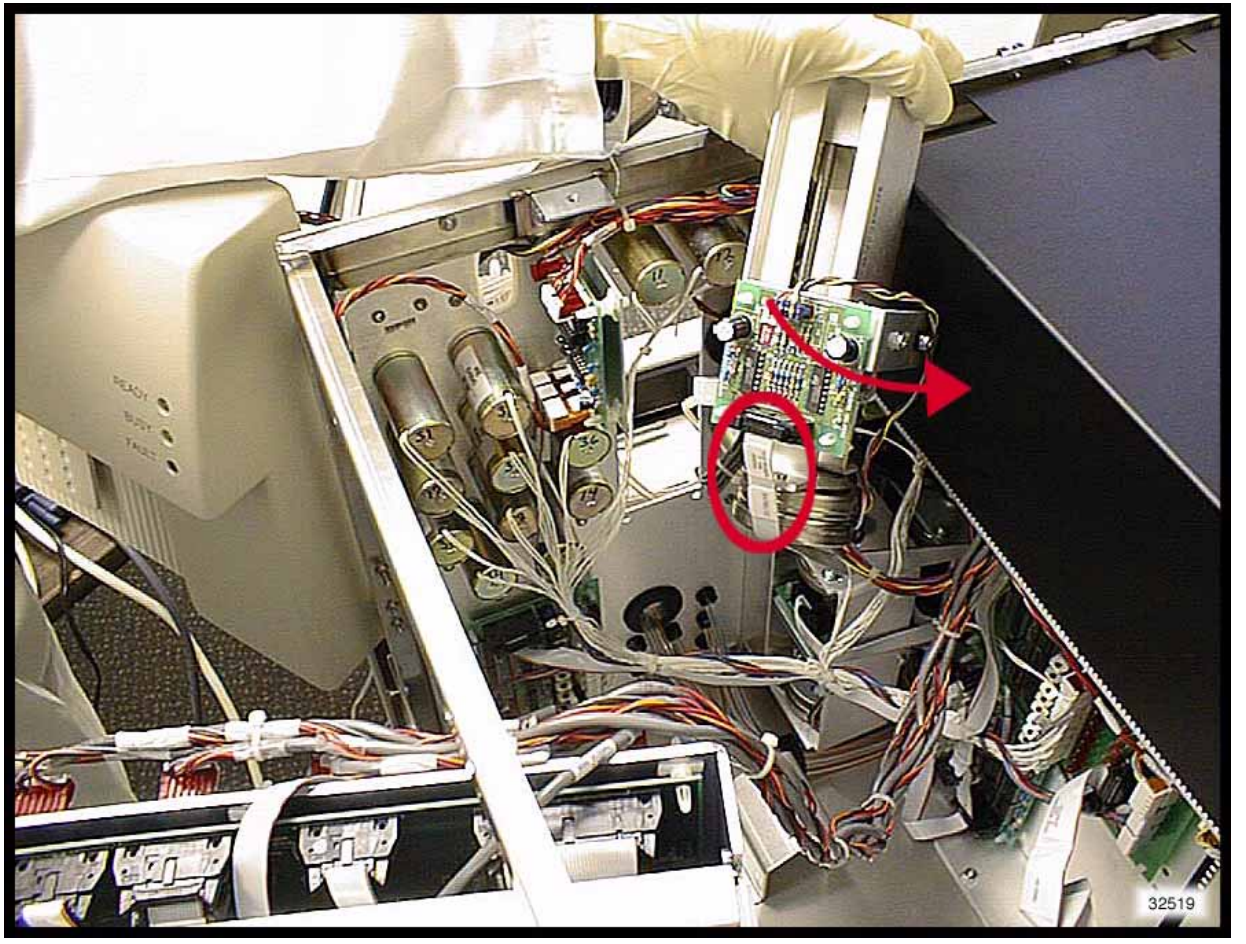
Replacement Procedure

Replace by following the above steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-27: ***Probe Assembly Removal***



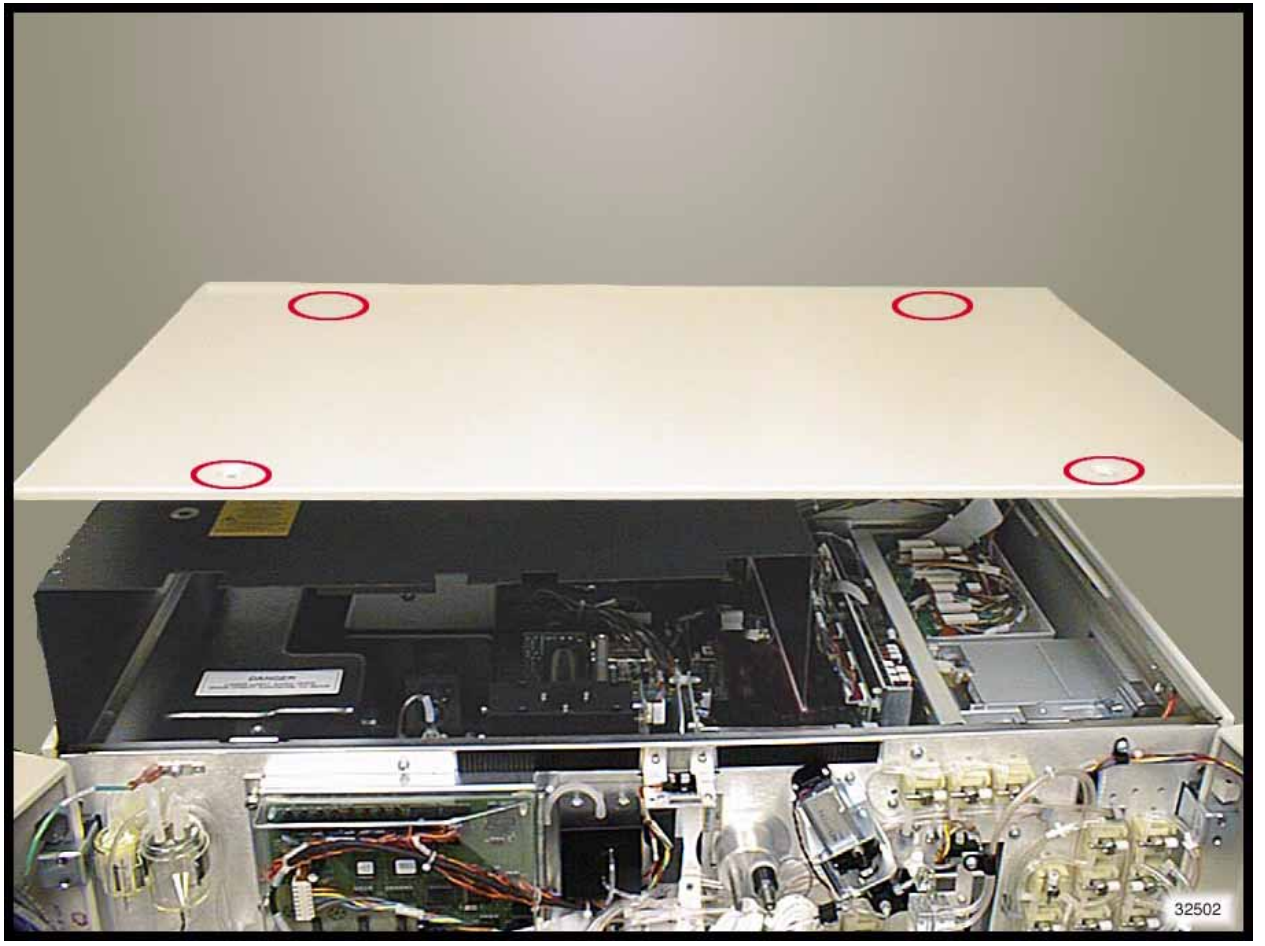
Optics Bench (RR-5)

Removal Procedure

DANGER:
High Voltage: Assure the power to the instrument is off. A high voltage charge may remain on the laser connector with the power off. Do not touch the male pins. Short male pins to Chassis.

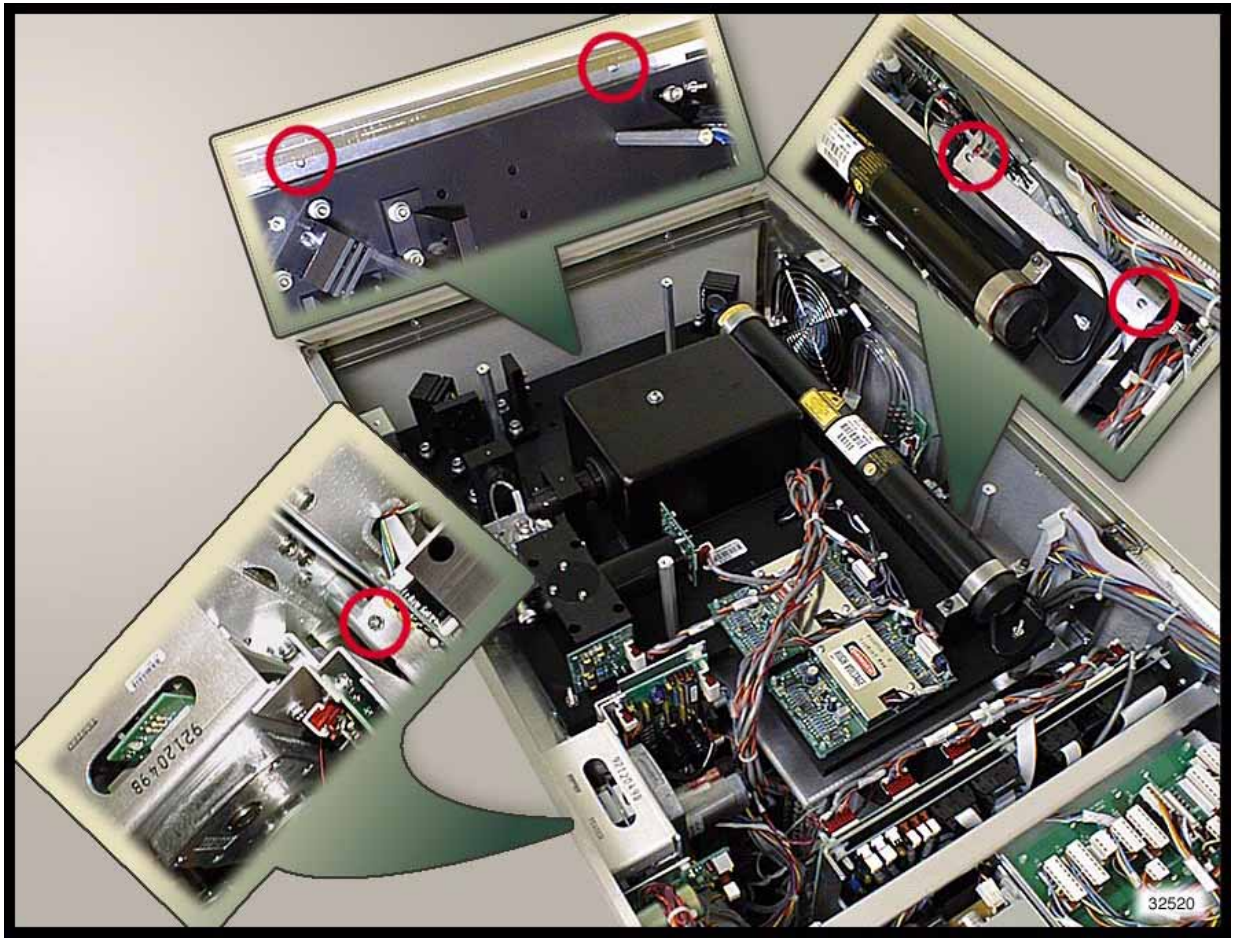
1. With the analyzer power off, remove the top cover (4 screws) and the optics cover (4 screws).

Figure 4-28: ***Top Cover & Optics Cover Removal***



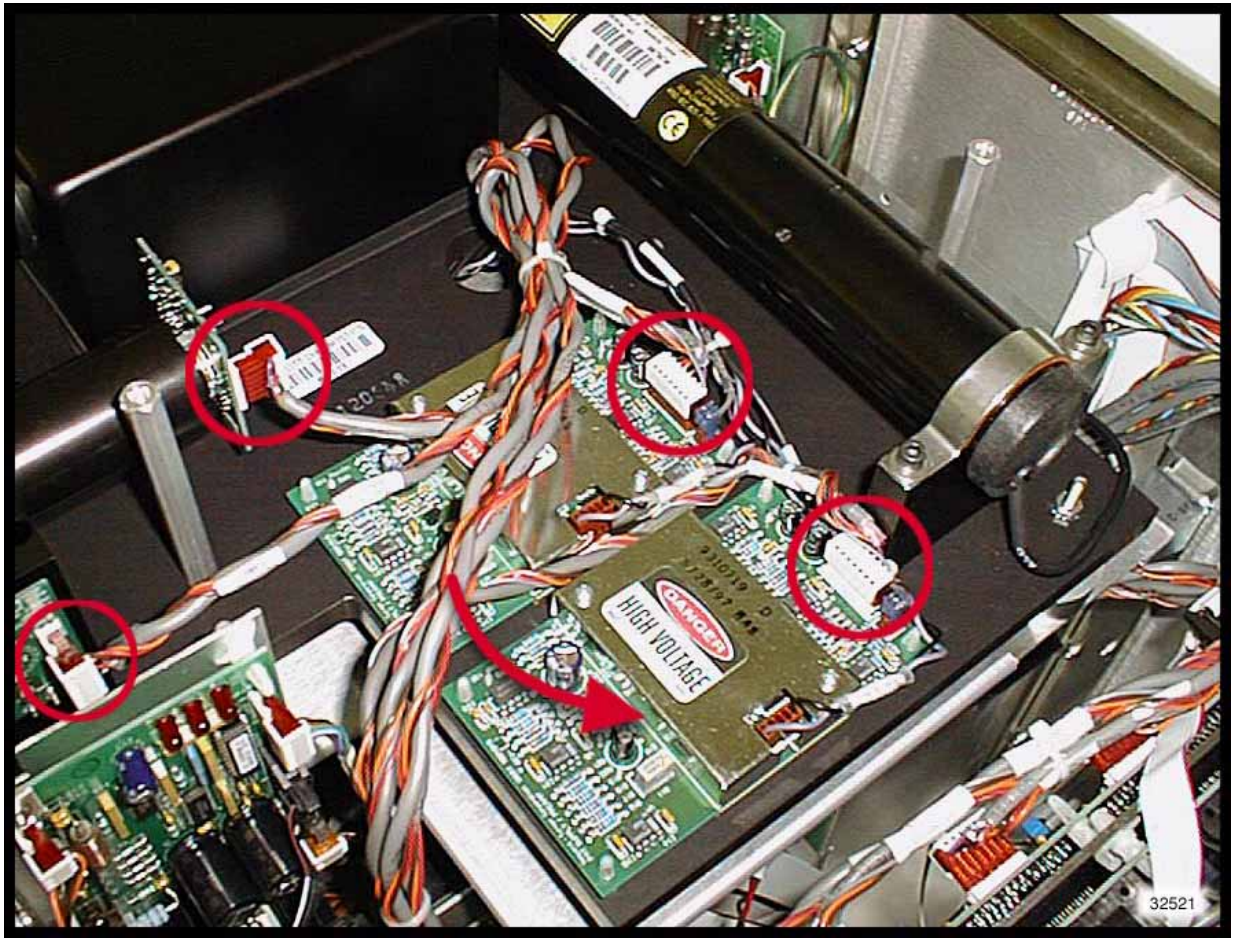
2. Remove the five optics mounting screws. Remove screws from the aluminum plate, not the black base of the Optics Bench.

Figure 4-29: ***Optics Bench Mounting Screws***



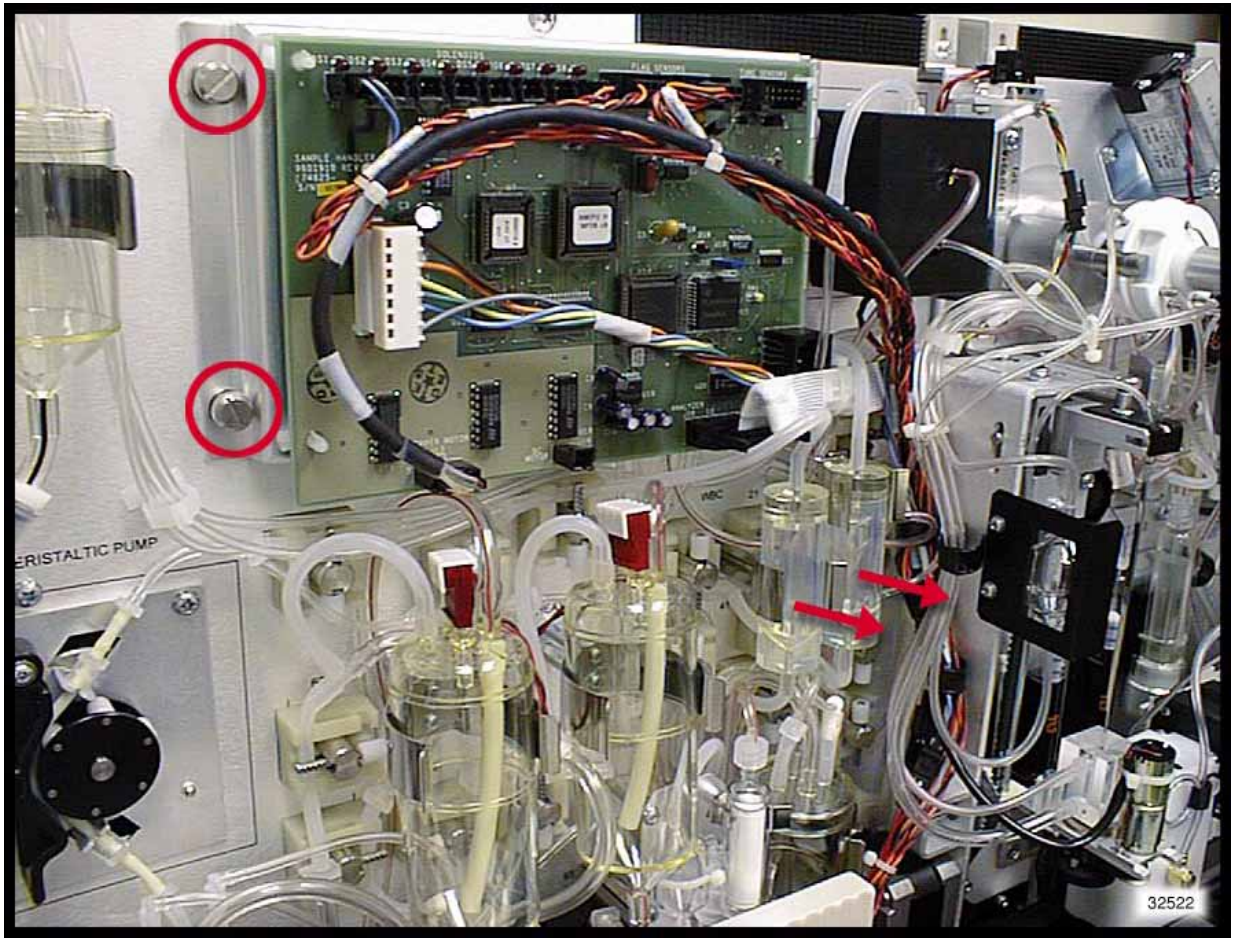
3. Remove the 4 signal cables from the optics bench. Lay the bundle away from the optics.

Figure 4-30: ***Optics Signal Cables***



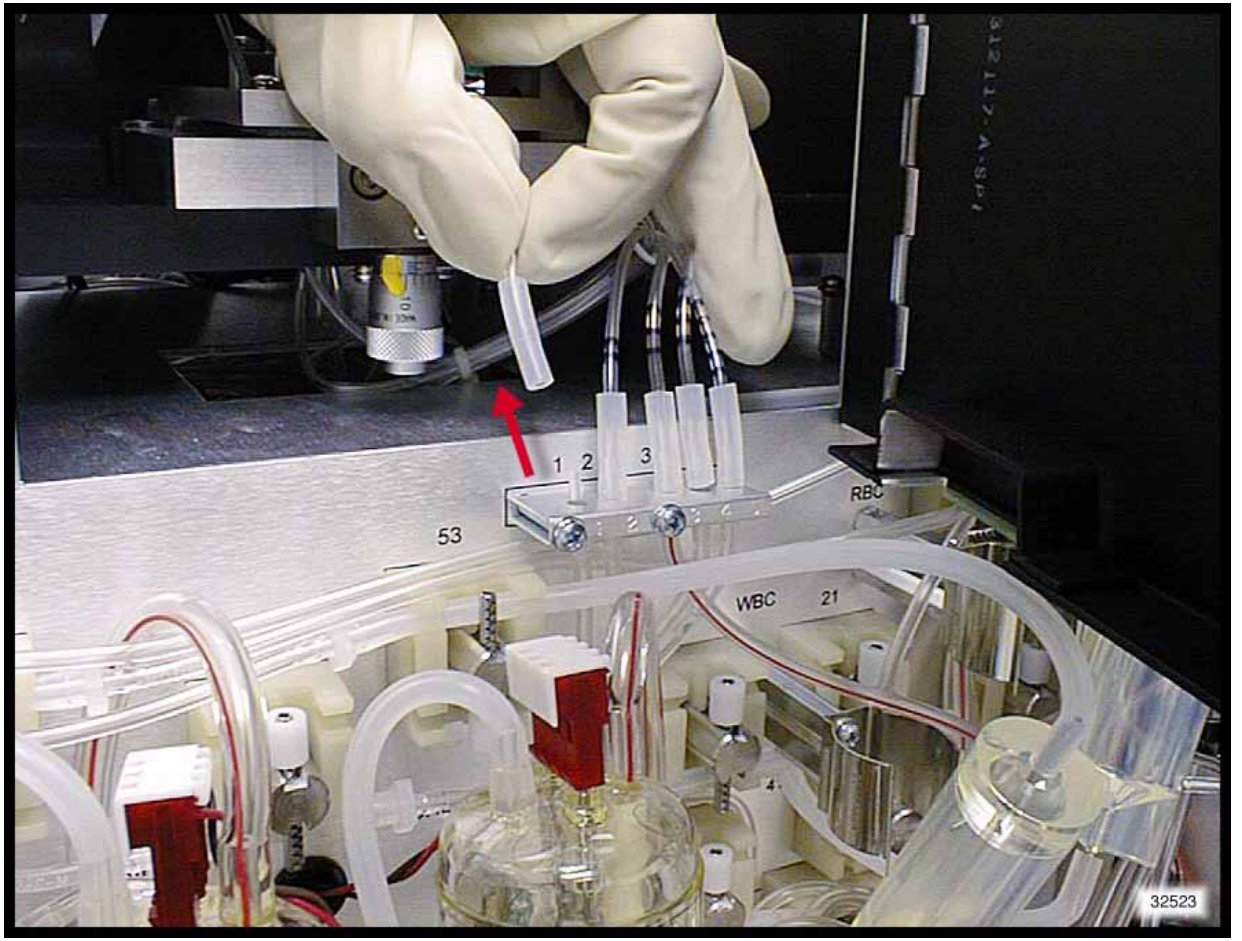
4. Remove the two mixing chambers. Do not disconnect the tubing. Loosen the two flow cell panel thumbscrews and open the panel.

Figure 4-31: ***Flow Cell Panel***



5. Disconnect the flow cell tubing (1 - 5) from the manifold.

Figure 4-32: ***Flow Cell Tubing***



6. Being careful not to stress any wires that may be connected to the main power supply, lift the optics bench out and place on top of back left corner of the chassis. Disconnect the brown and yellow wire from top of the main power supply and remove optics bench.

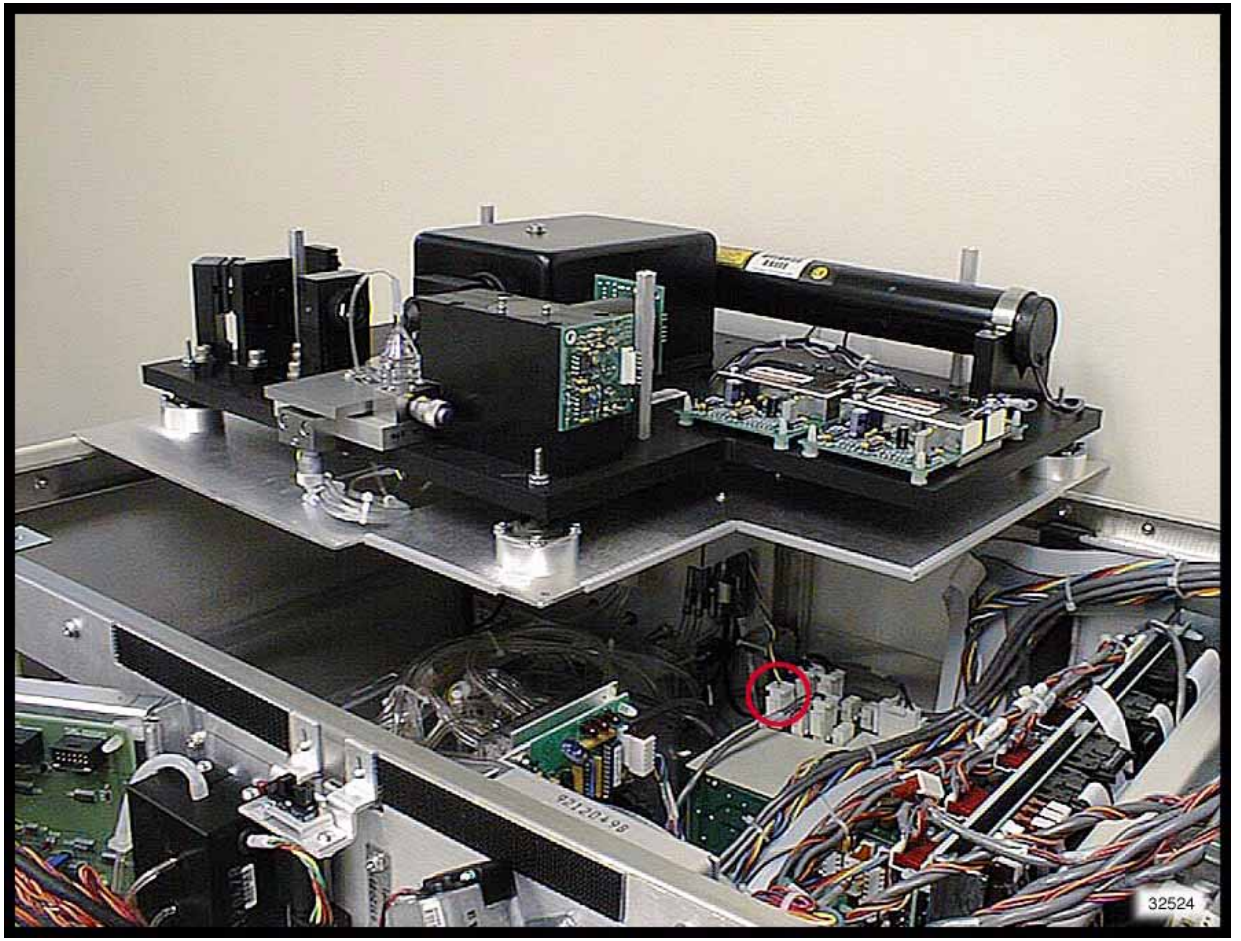
Replacement Procedure

Replace by following the above steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-33: ***Optics Bench Removal***



Power Supply (RR-6)

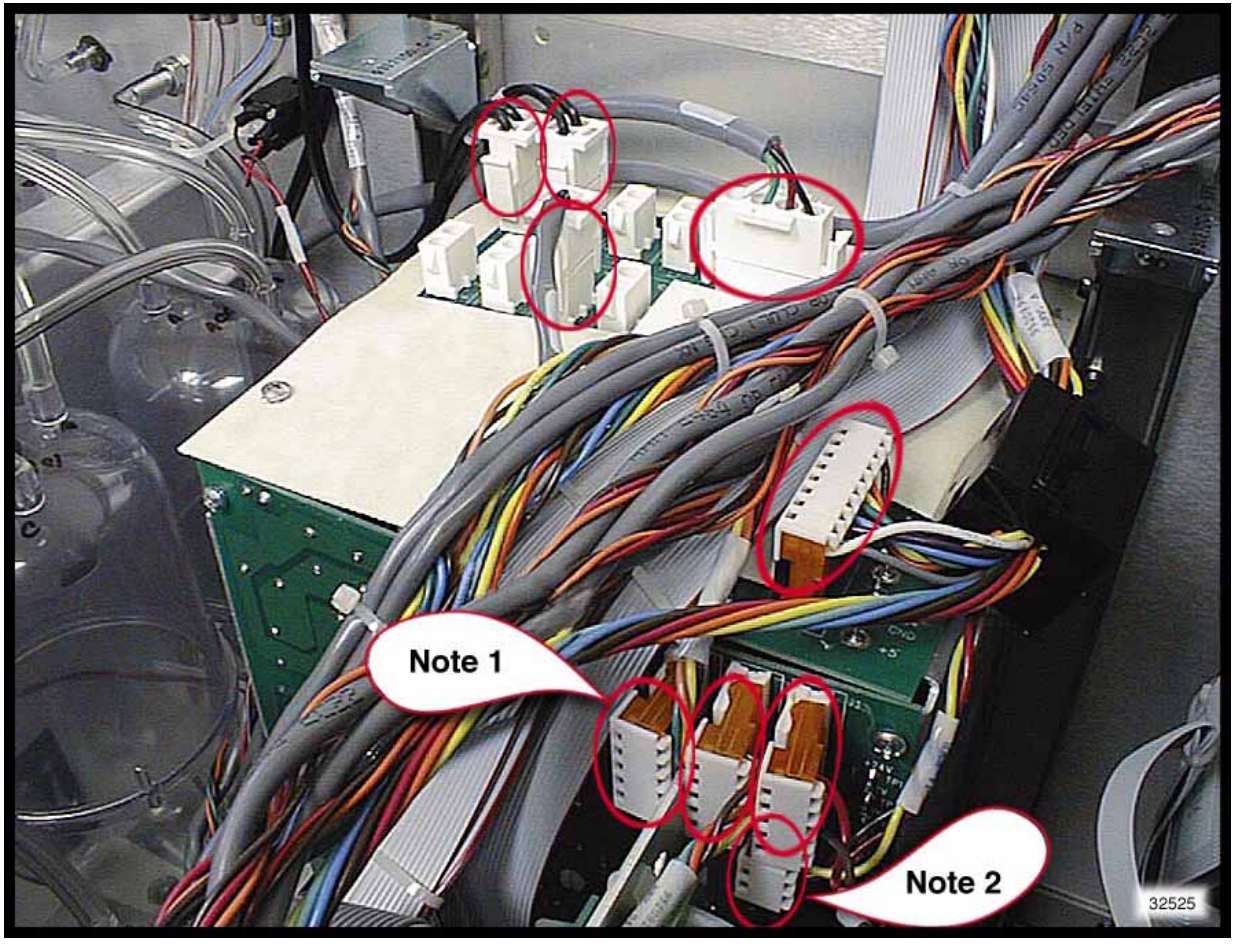
Removal Procedure

1. With analyzer power off, remove optics bench (RR-5).
2. Disconnect the nine connectors shown on the power supply.

   Note 1: Five-pin connections J1, J2, and J3 are the same.

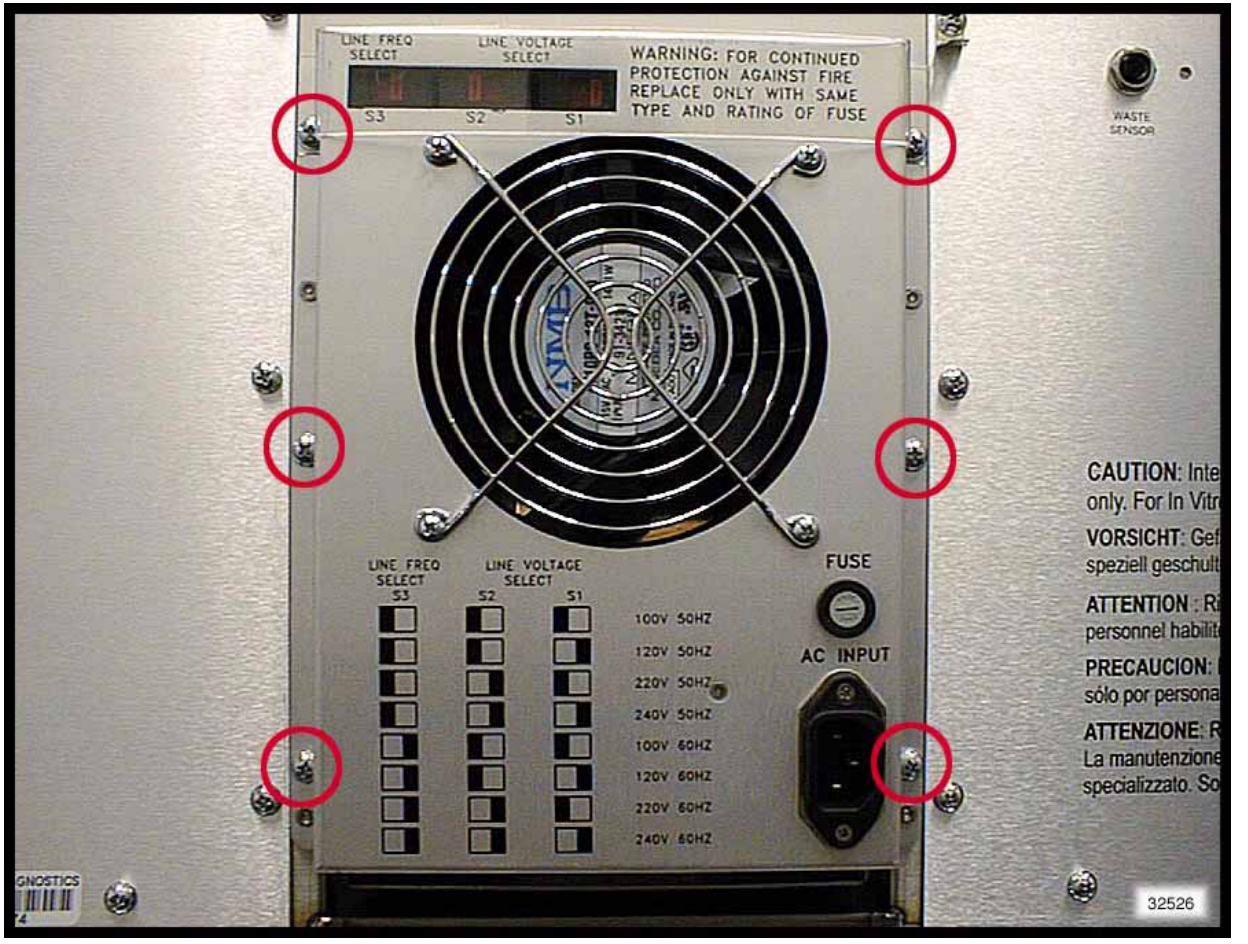
   Note 2: Three-pin connection is directly above an **empty** two-pin connection.

Figure 4-34: ***Power Supply Connections***



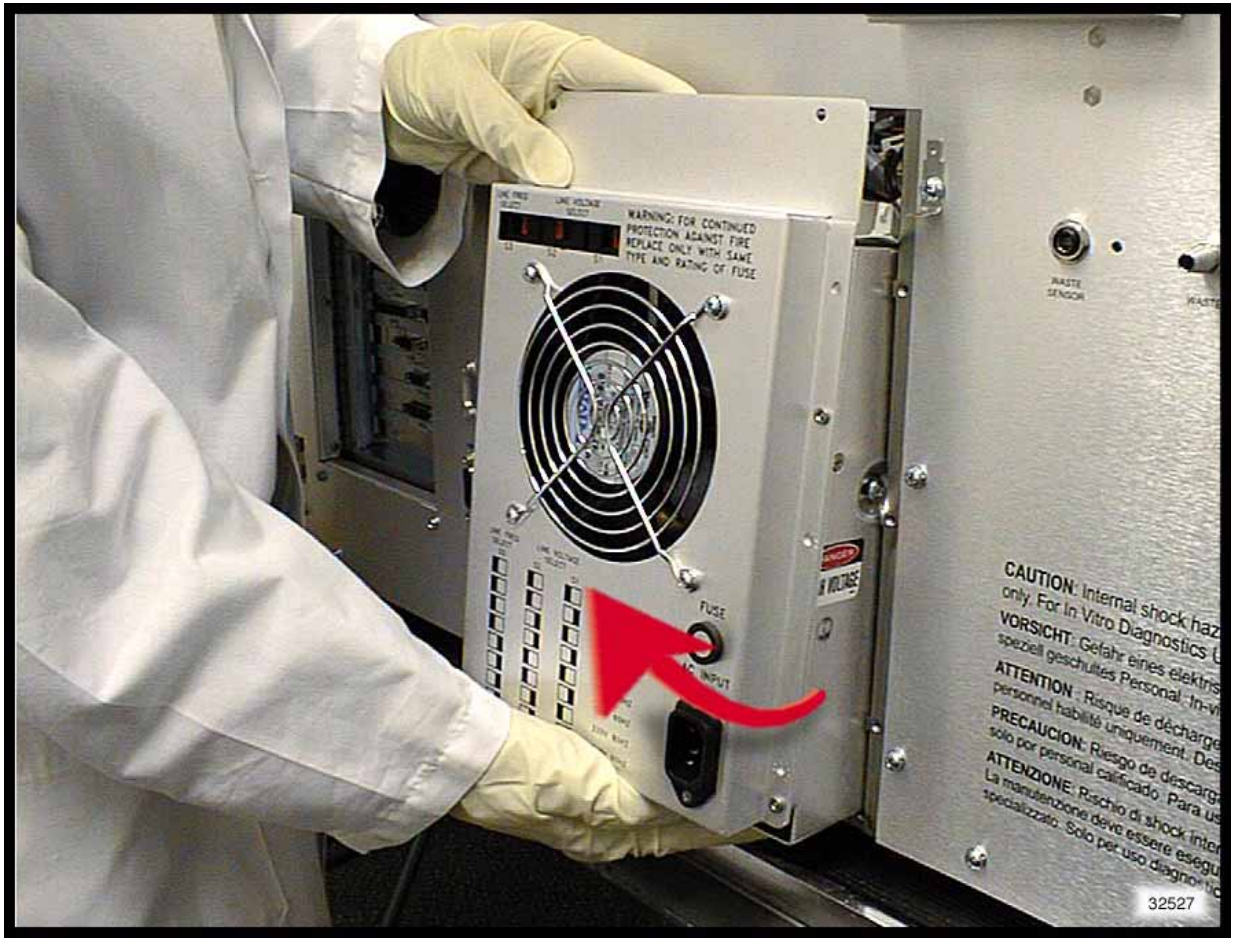
3. Remove power supply mounting screws (6 places).

Figure 4-35: ***Power Supply Mounting Screws***



4. Lift power supply up and out.

Figure 4-36: ***Power Supply Removal***


WARNING: FOR CONTINUED PROTECTION AGAINST FIRE REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE
FUSE
AC INPUT
CAUTION: Internal shock haz
only. For In Vitro Diagnostics
VORSICHT: Gefahr eines elektris
ATTENTION : Risque de décharge
PRECAUCION: Riesgo de descarg
ATTENZIONE: Rischio di shock
32527

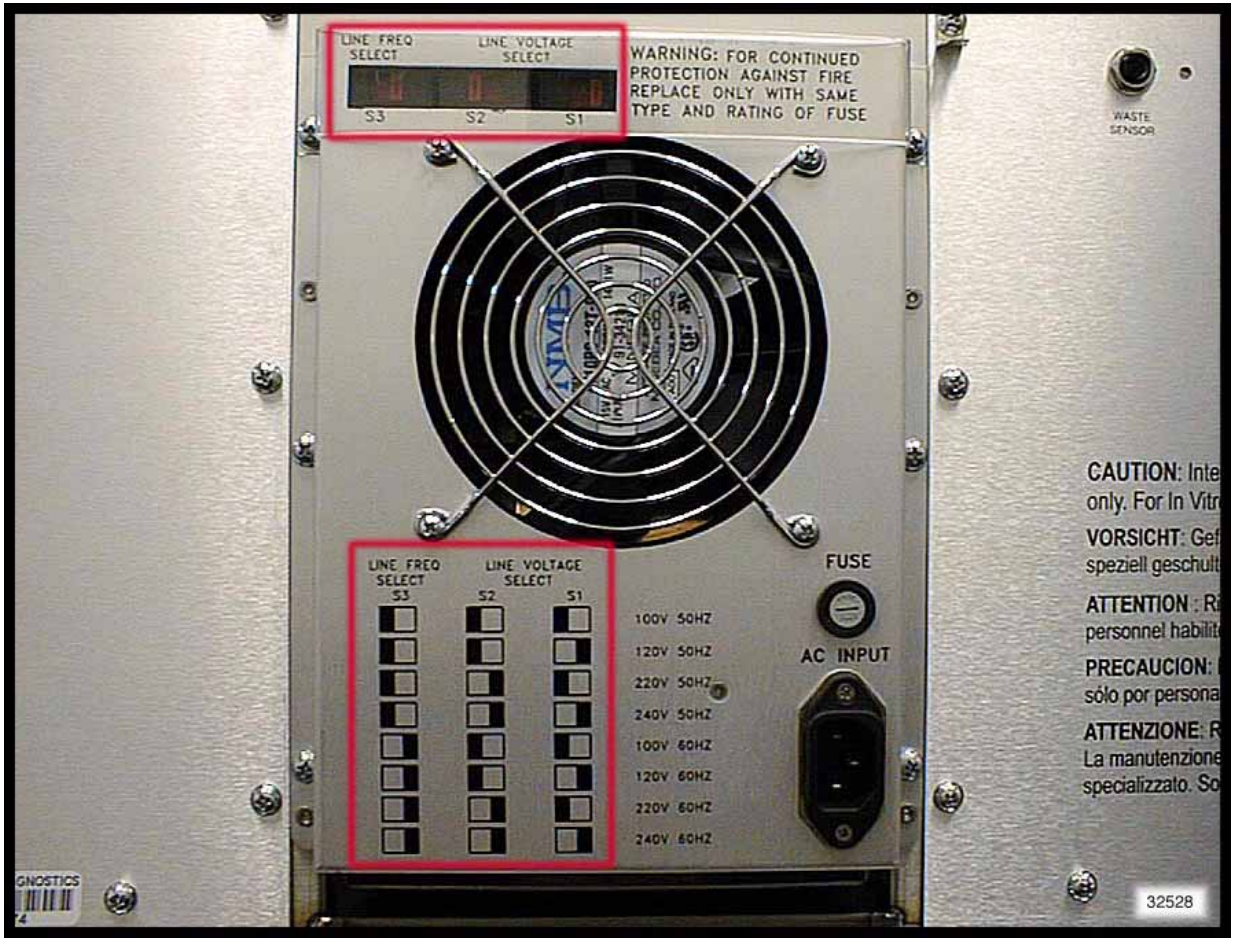
Replacement Procedure

1. Ensure Line Frequency and Line Voltage Select switches are set correctly, according to the photo.
2. Ensure fuse is present and OK.
3. To reinstall, follow the removal steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-37: ***Power Supply Line Frequency & Line Voltage Select Switches***



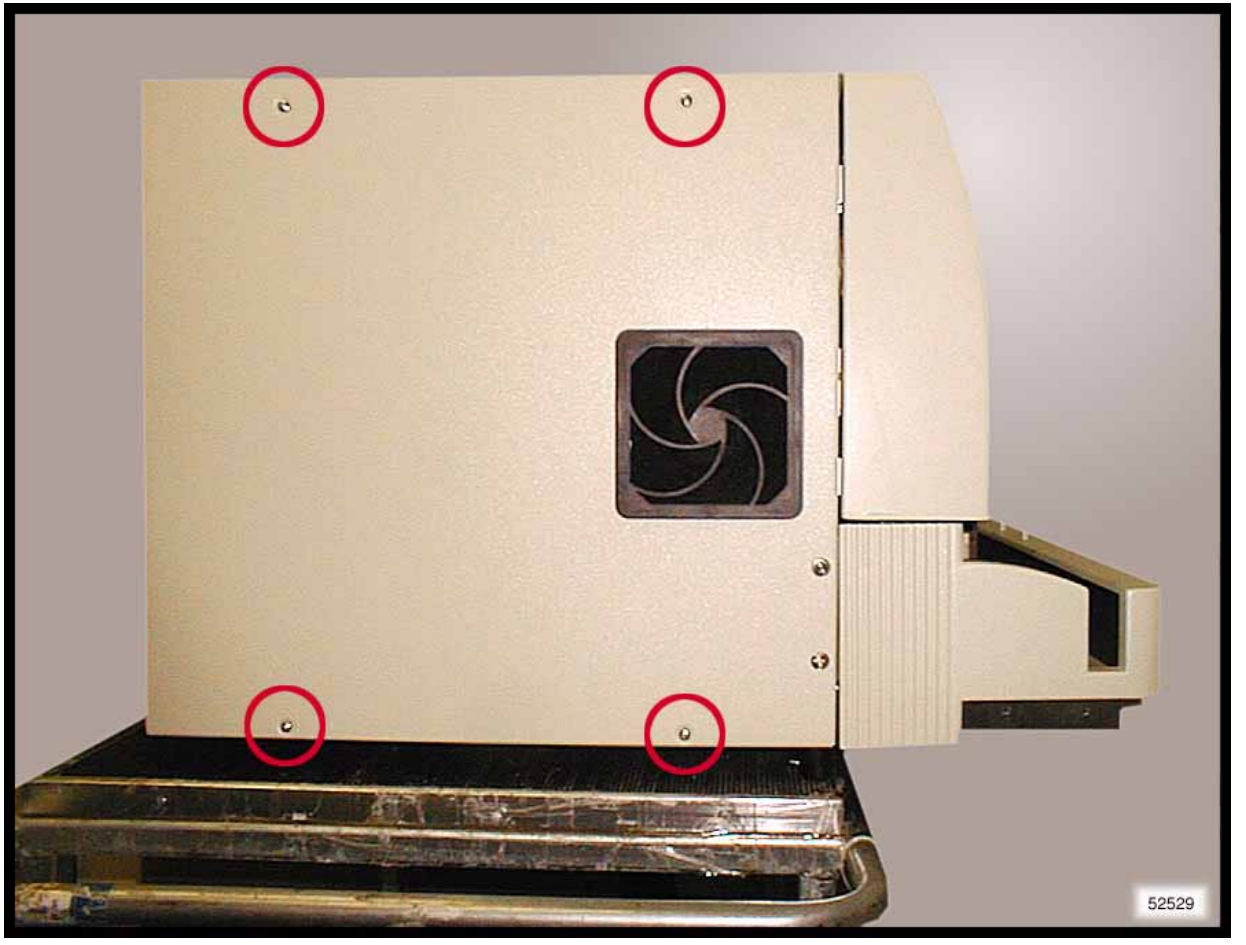
Vacuum/Pressure Assembly (RR-7)

Removal Procedure

NOTE: It is no longer necessary to remove the Vacuum/Pressure Assembly when servicing the VPM, pumps, etc. The Assembly is mounted on movable slides in 3200 analyzers built after May, 1998. To access the Assembly:

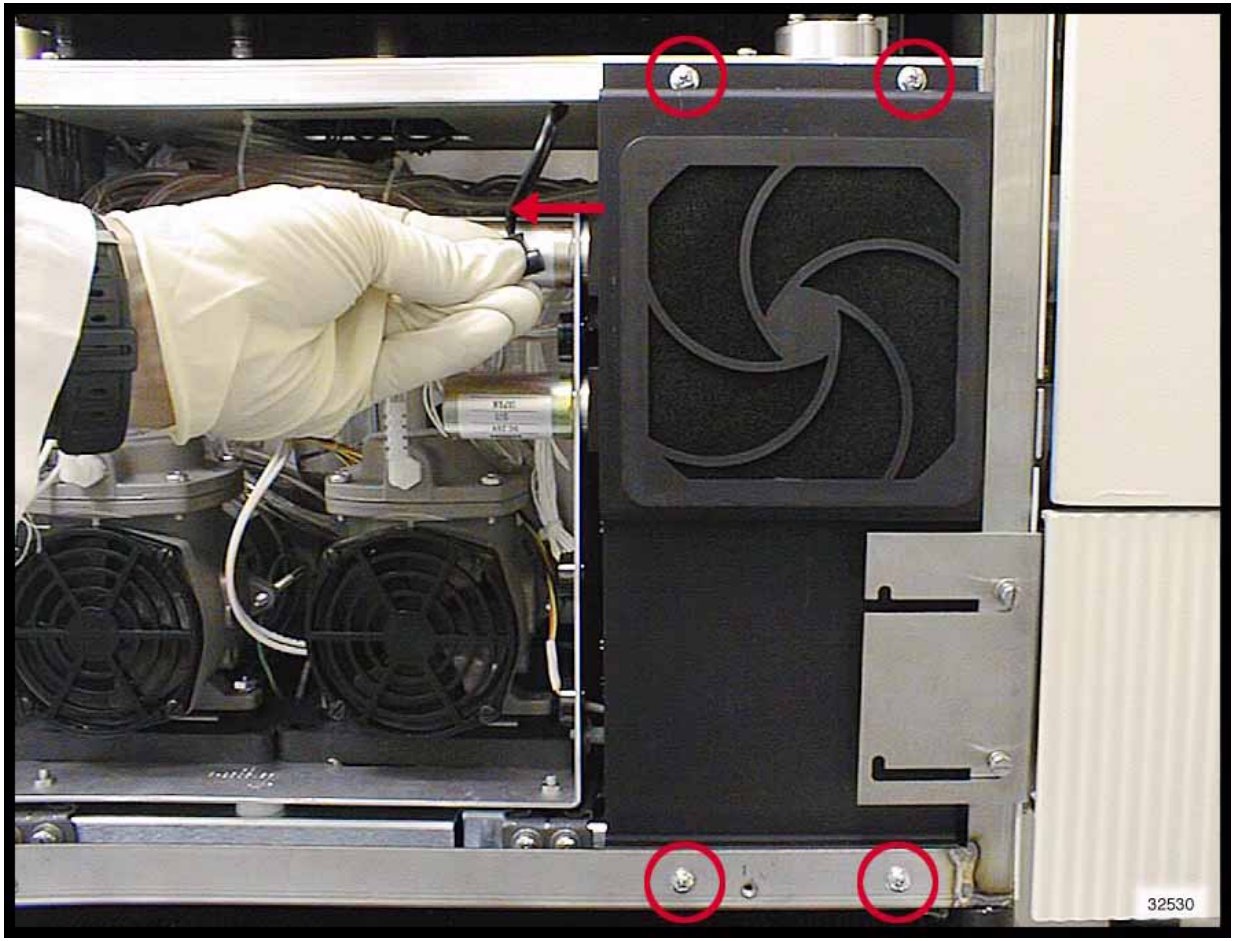
1. With the analyzer power off, remove the left side panel (4 screws).

Figure 4-38: ***Left Side Panel Removal***



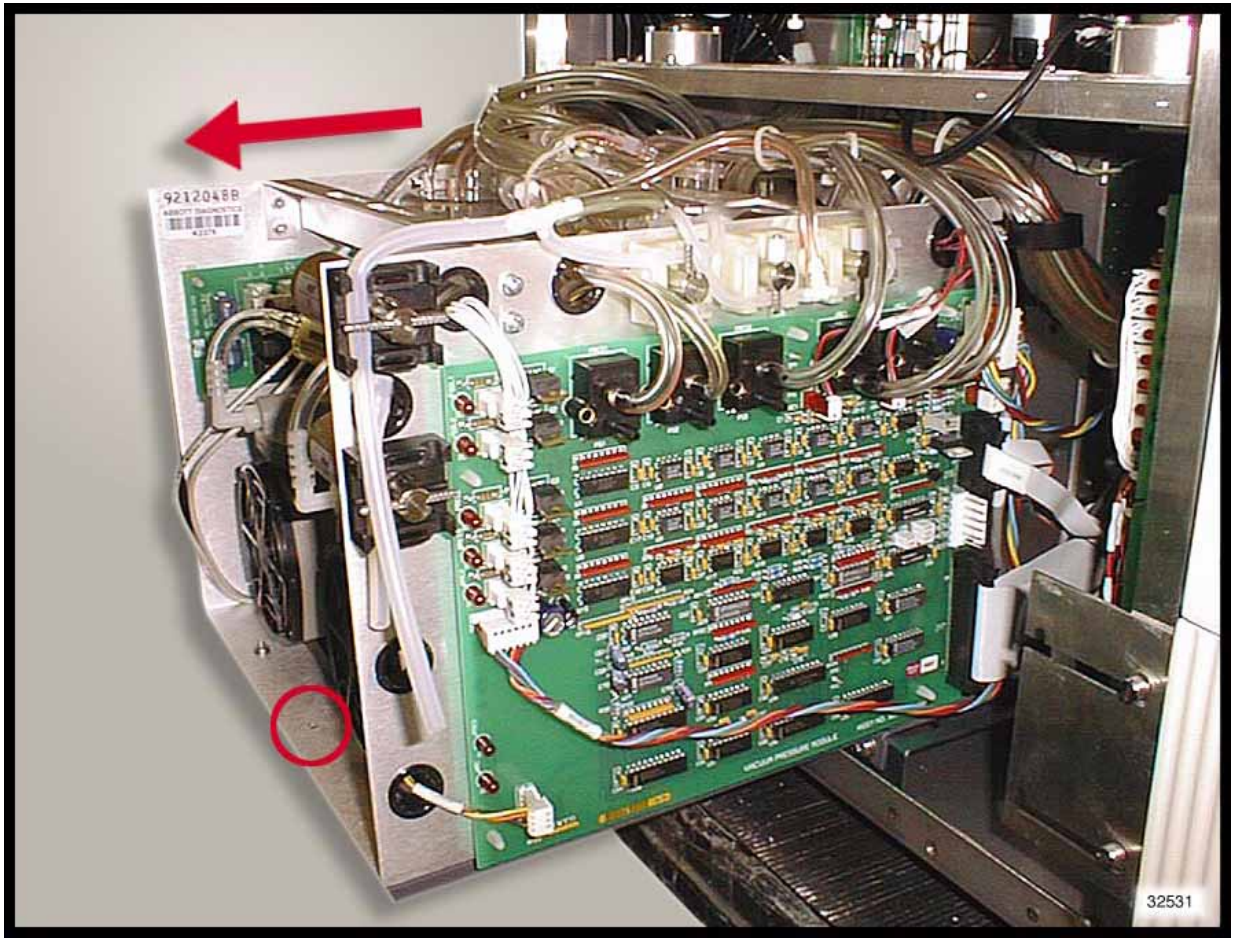
2. Disconnect the fan power cord and remove fan assembly (4 screws).

Figure 4-39: ***Fan Assembly Removal***



3. Remove the locking screw and pull vacuum/pressure assembly out until unit locks in place.

Figure 4-40: ***Vacuum/Pressure Assembly Removal***



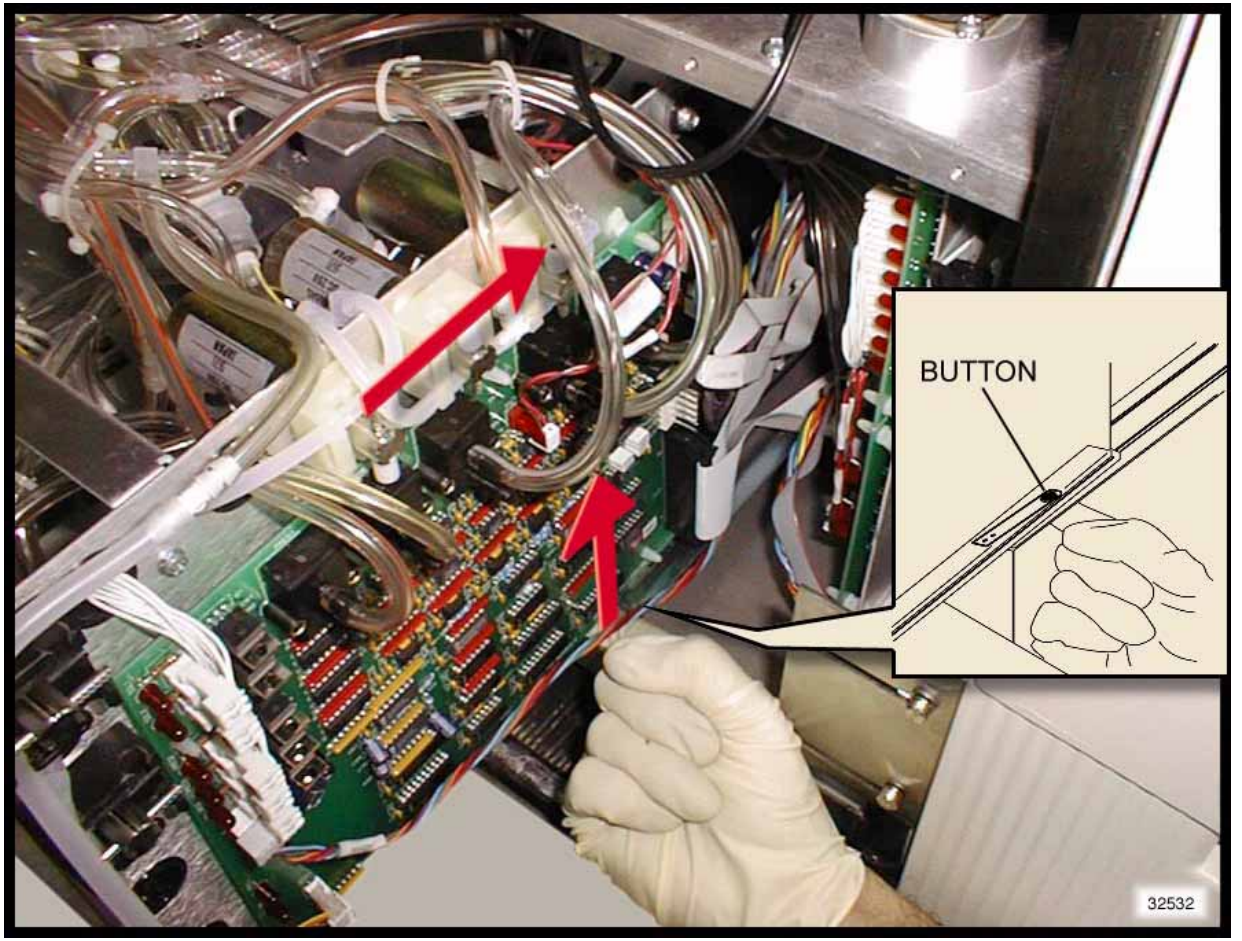
Replacement Procedure

1. To return assembly to normal position, push up on clip and push assembly back in place.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-41: ***Vacuum/Pressure Assembly Return***



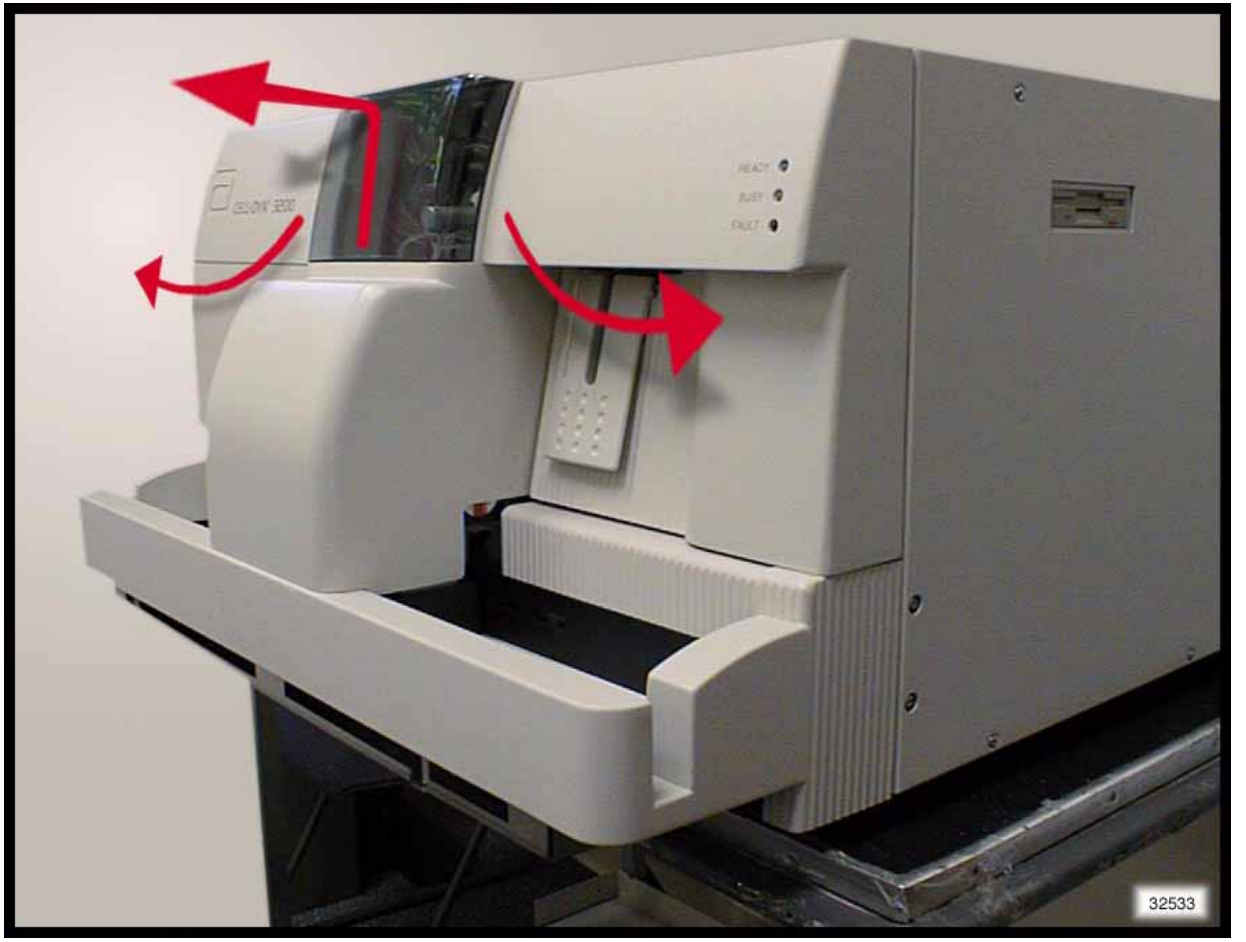
Tower Assembly (RR-8)

Removal Procedure

Warning Potential Biohazard:
The aspiration needle/probe is sharp and potentially contaminated with infectious materials. Avoid contact with the tips of the needle/probe.

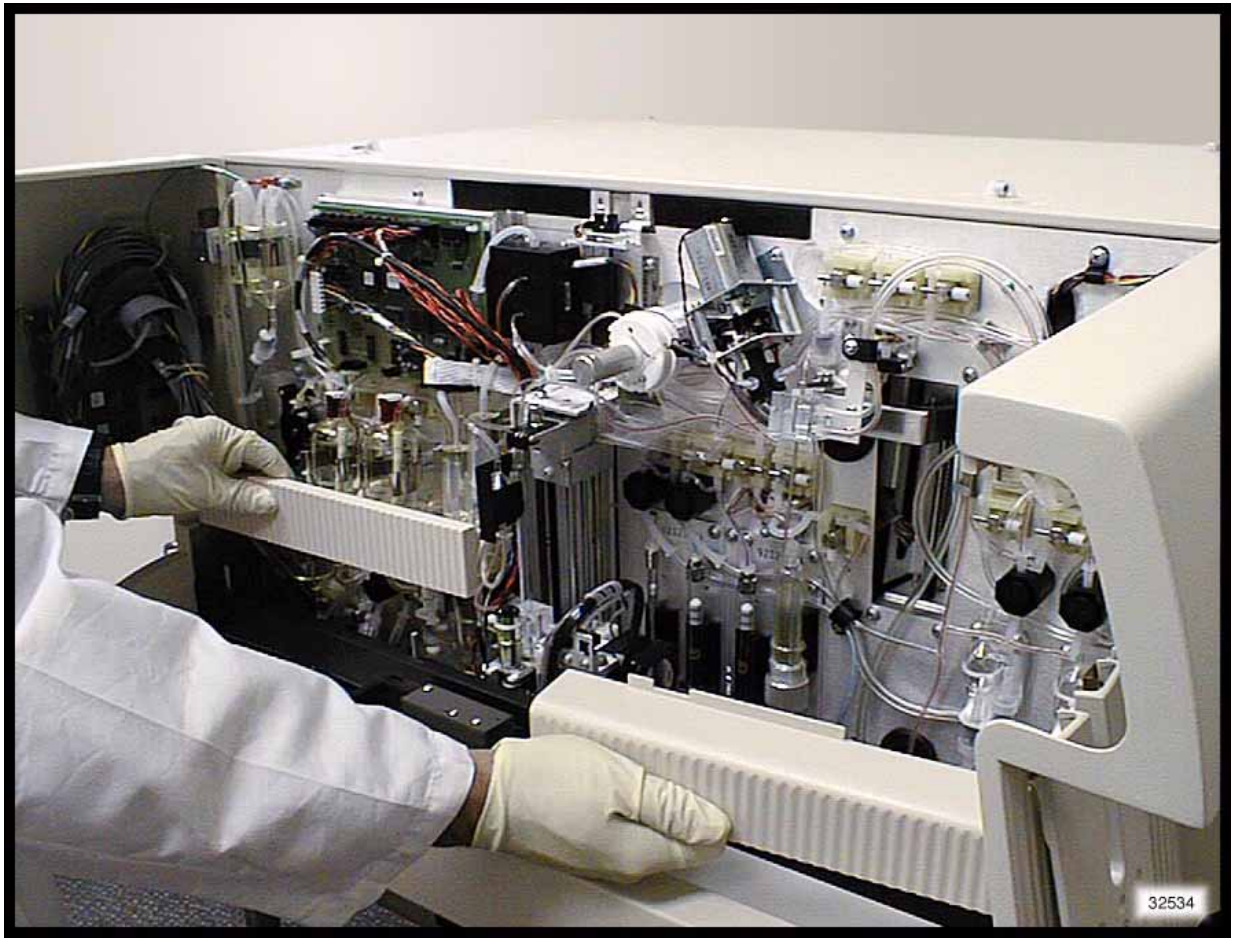
1. With the analyzer power off, open the left and right access doors and remove the safety cover.

Figure 4-42: ***Front Access Doors***



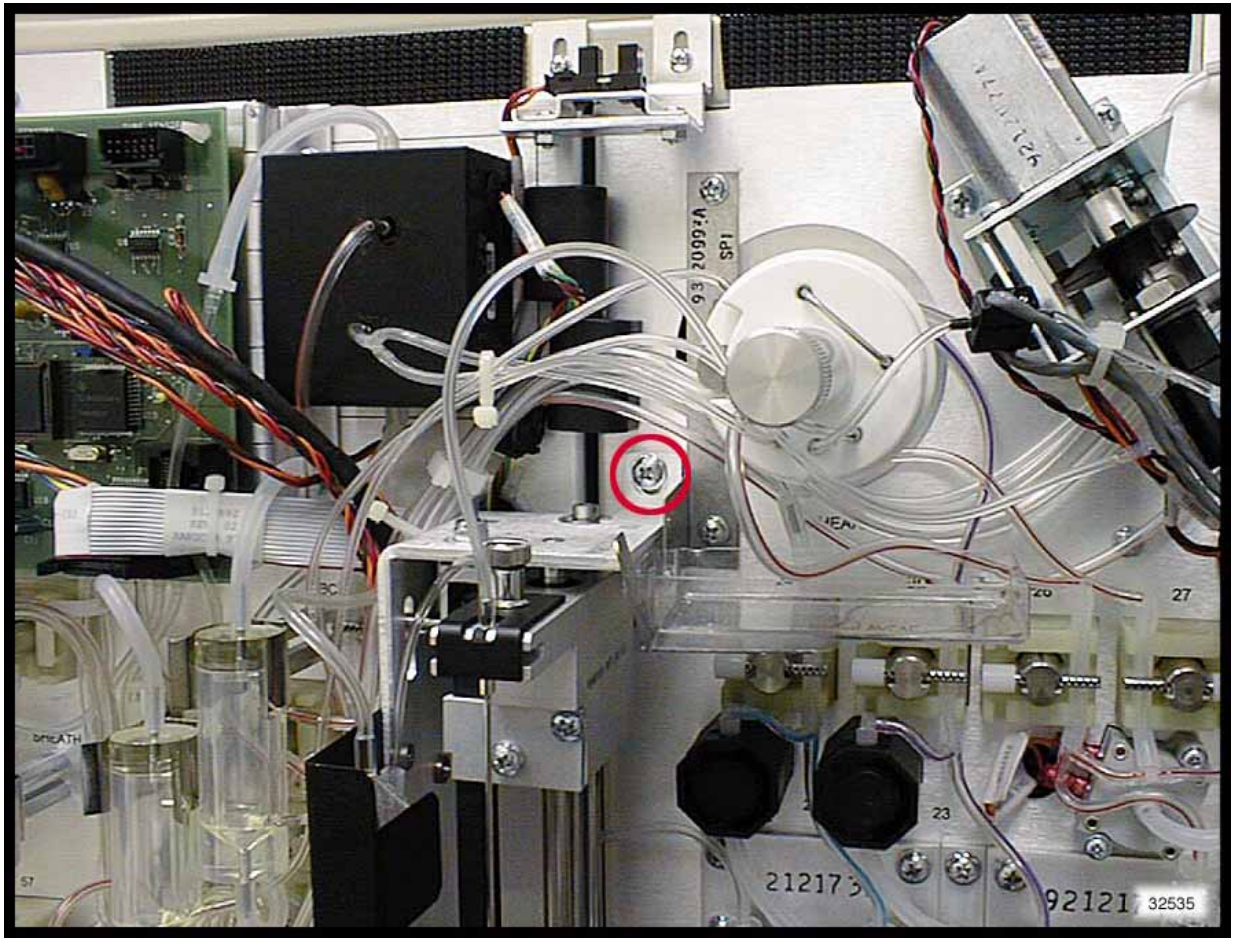
1. Remove the left and right panels from the rear rail of the sample loader.

Figure 4-43: ***Sample Loader Panels***



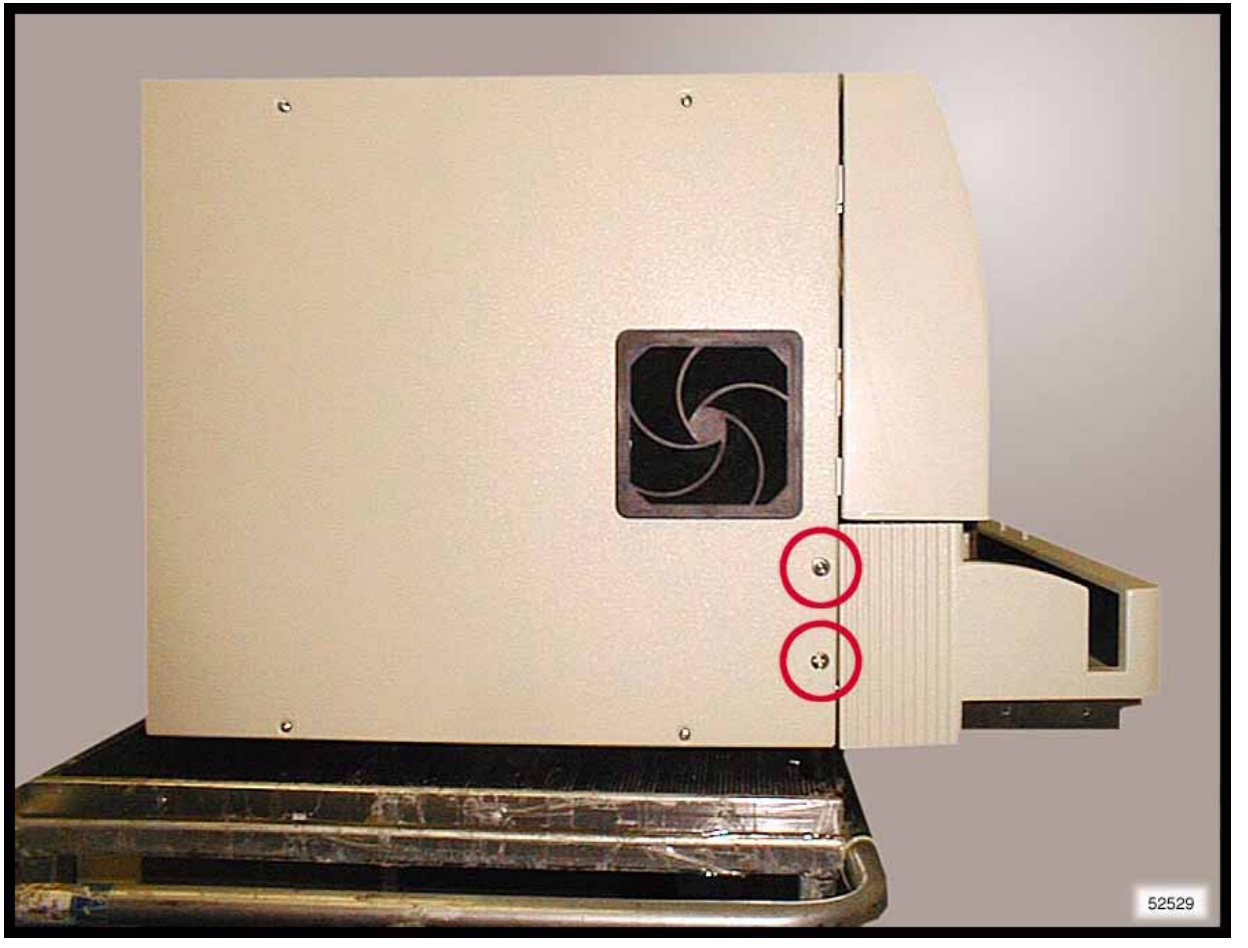
2. Remove the screw at the top of the tower assembly.

Figure 4-44: ***Tower Assembly Screw***



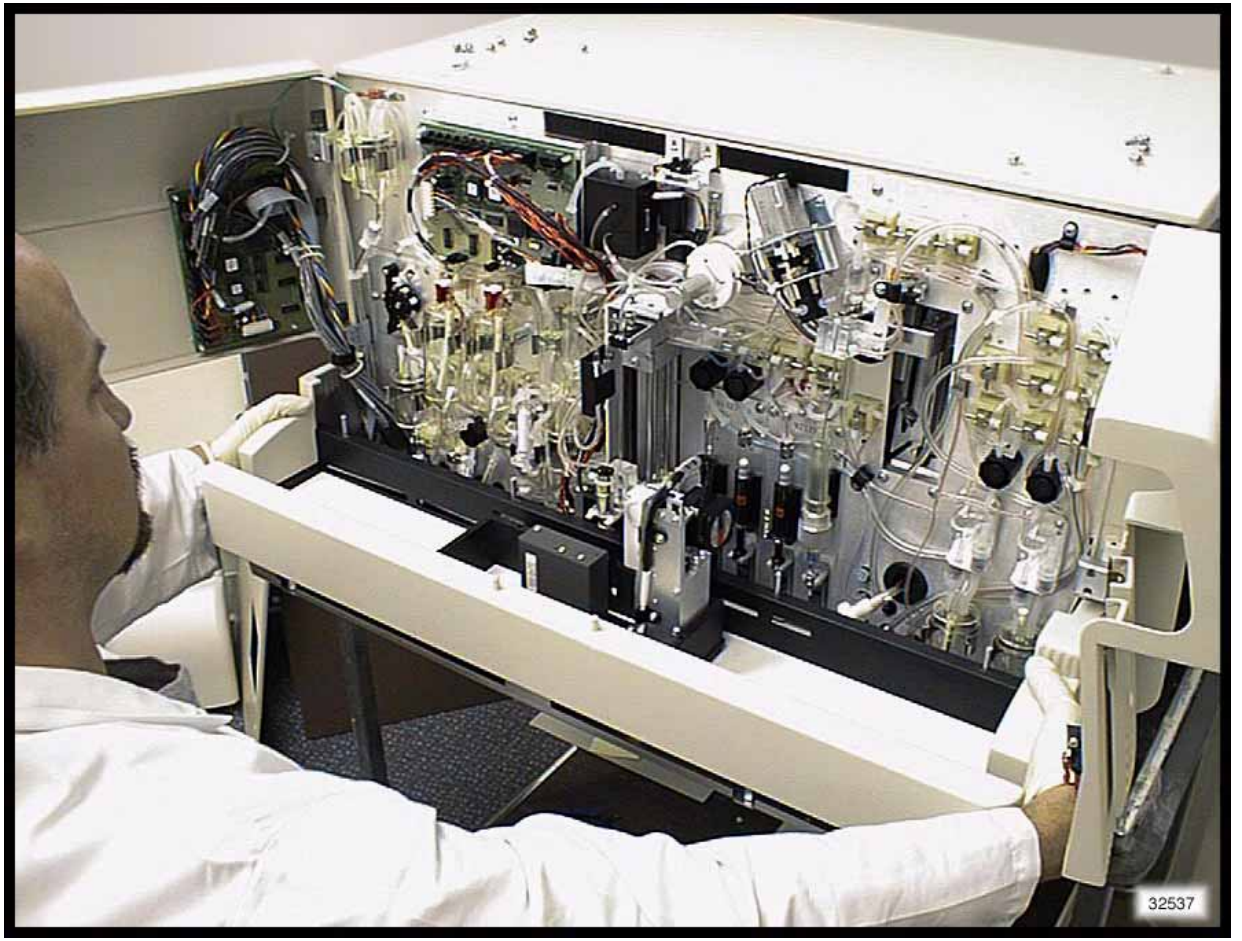
3. Loosen the two screws at each end of the sample loader just one turn.

Figure 4-45: ***Sample Loader End Screws***



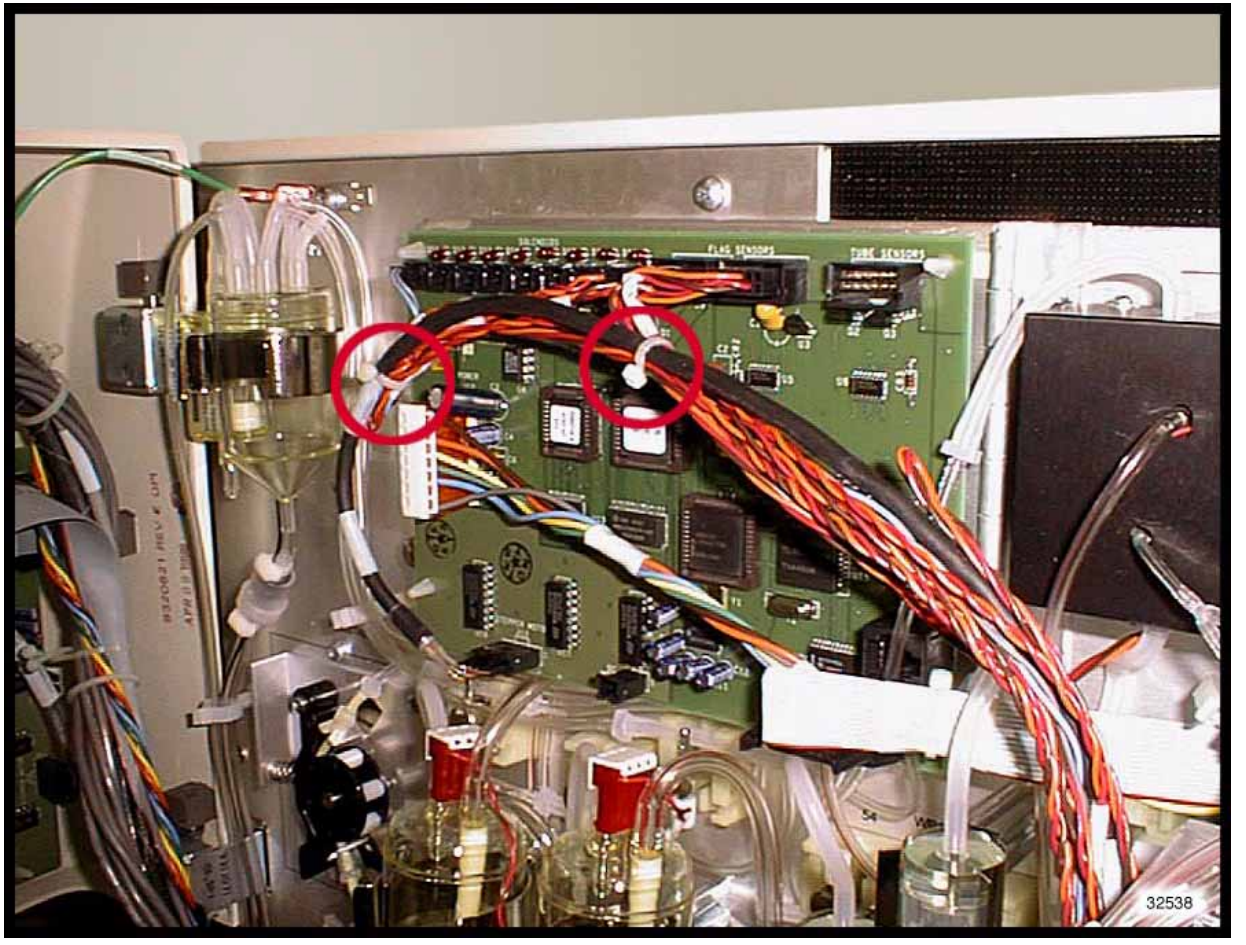
4. Lift sample loader and slide forward until it stops (about 2”).

Figure 4-46: ***Slide Sample Loader Forward***



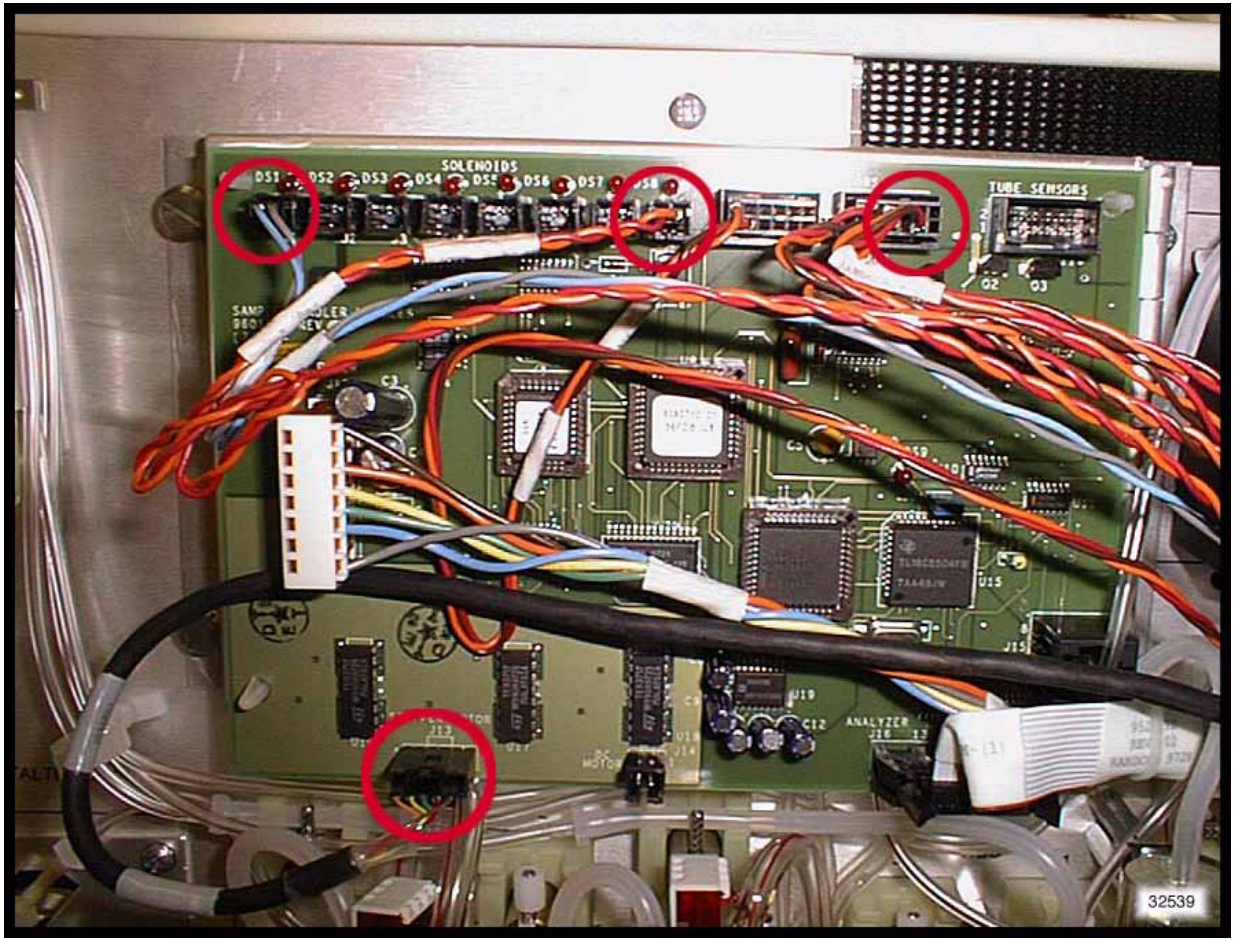
5. Cut the two tie wraps around cable bundle in front of flow cell panel.

Figure 4-47: ***Tower Cable Tie Wraps***



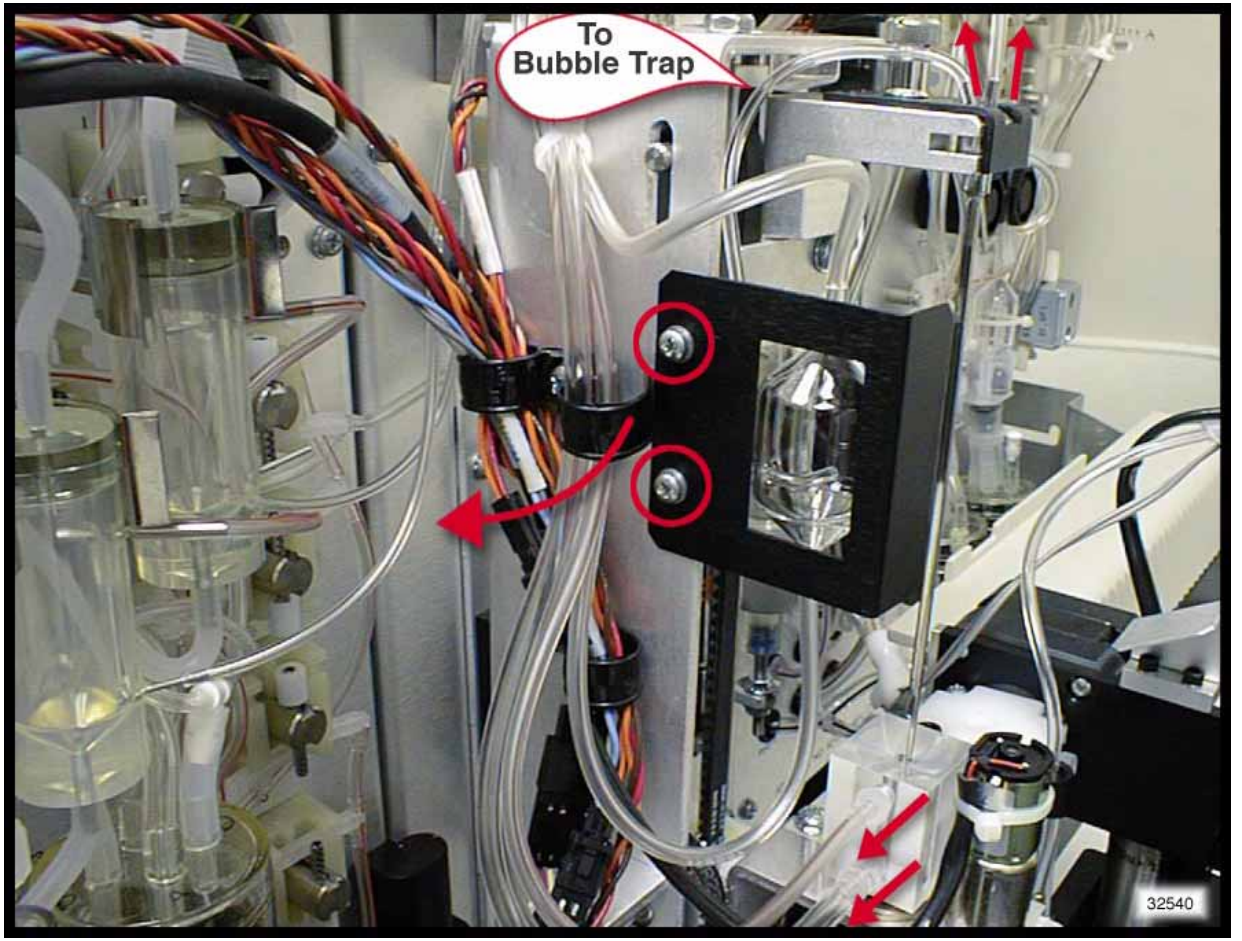
6. Disconnect J1, J8, J10 and J13 from the SHM Bd mounted to the flow cell panel.

Figure 4-48: ***Tower Assembly Cables***



7. Perform the following steps:
   a. Disconnect the tubing at aspiration probe and wash block
   b. Remove the glass bubble trap (2 screws). Do not disconnect tubing.
   c. Lift the tubing from under the clip.

Figure 4-49: ***Tower Assembly Tubing***



8. Remove the three hex head (7/64” allen) screws from the base of the Tower Assembly and lift the assembly out.

   NOTE: Long screw at base.

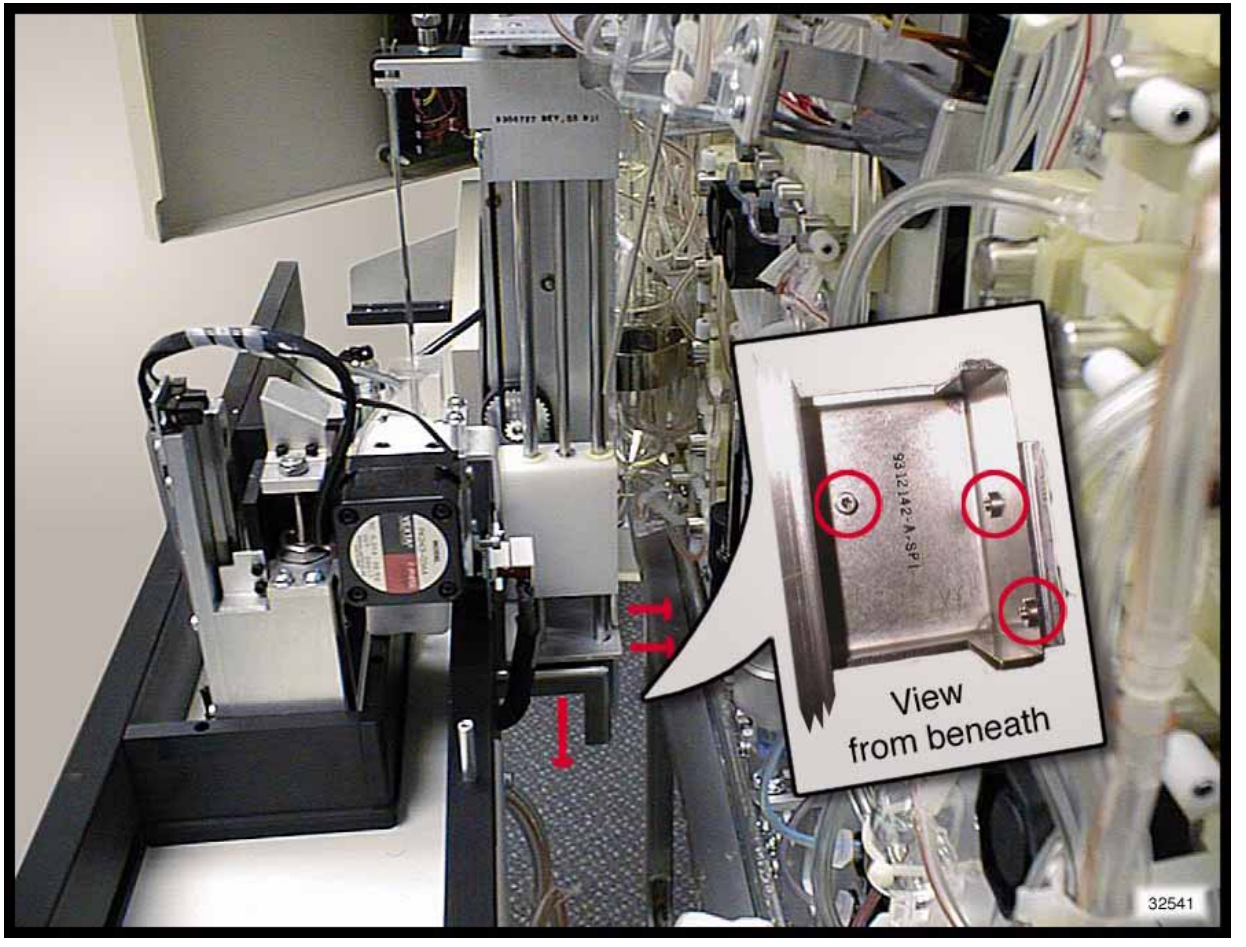
Replacement Procedure

Replace by following the above steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-50: ***Tower Assembly Removal***

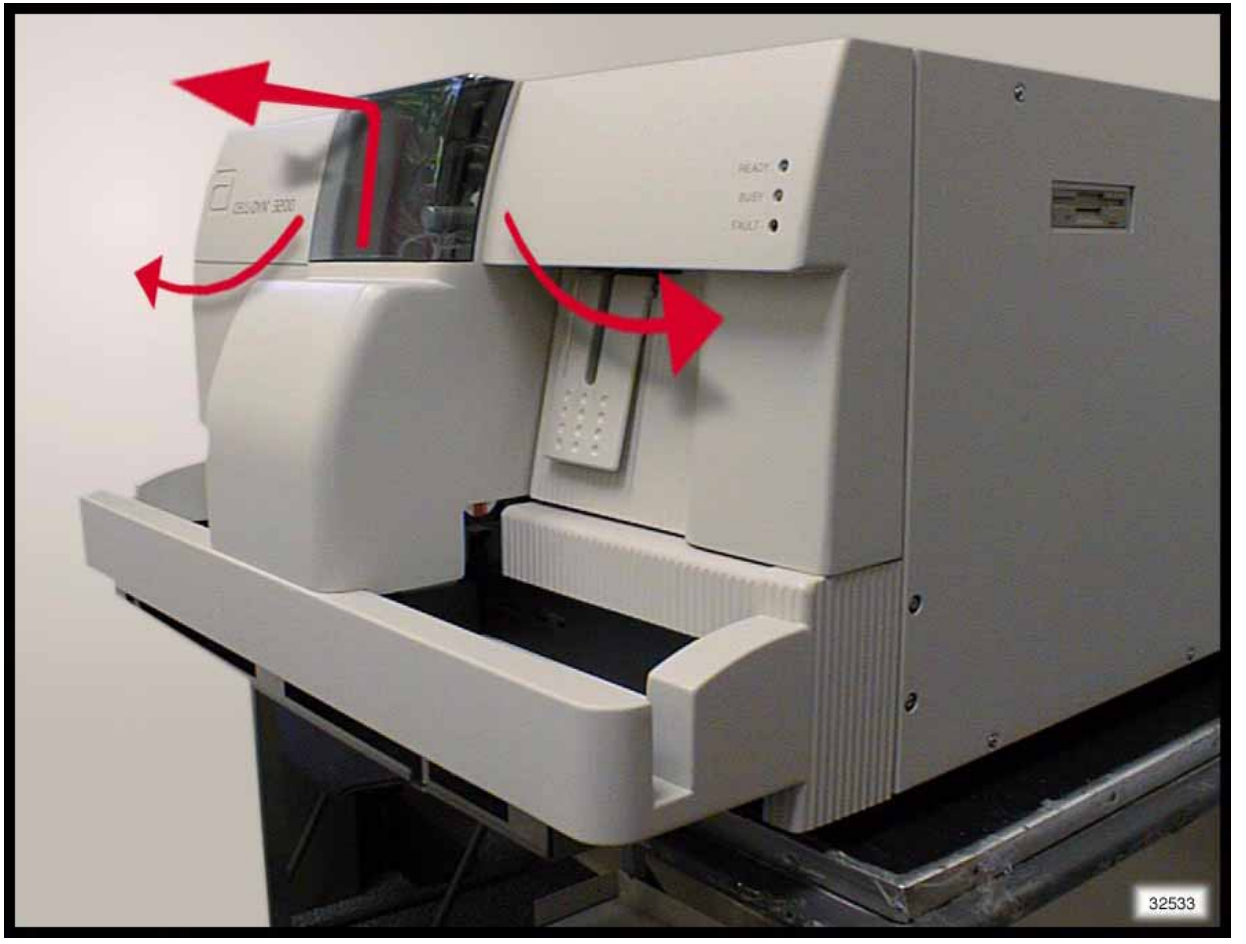


HGB Flow Cell (RR-9)

Removal Procedure

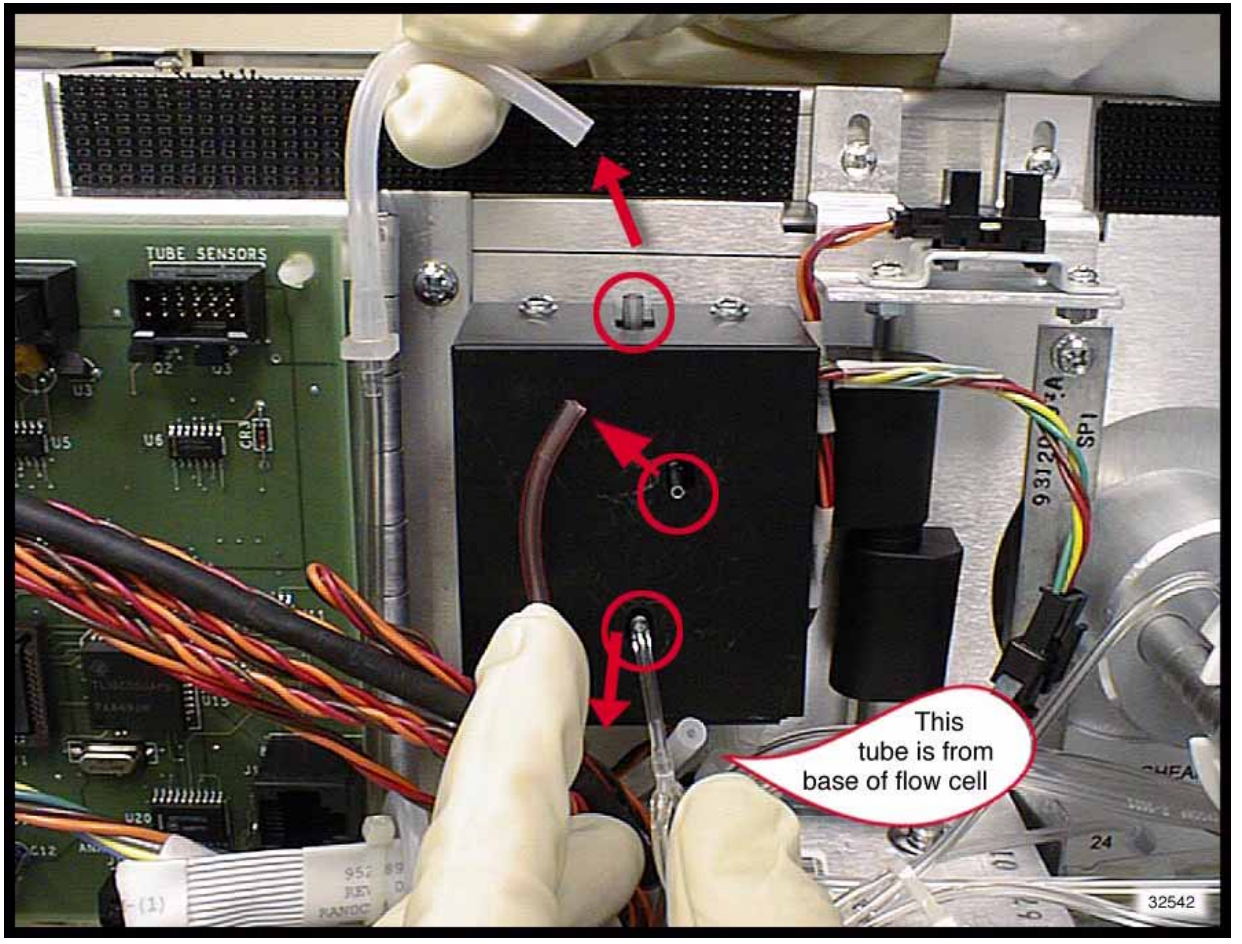
1. With analyzer power off, open left and right access doors and remove front cover.

Figure 4-51: ***Front Access Doors***



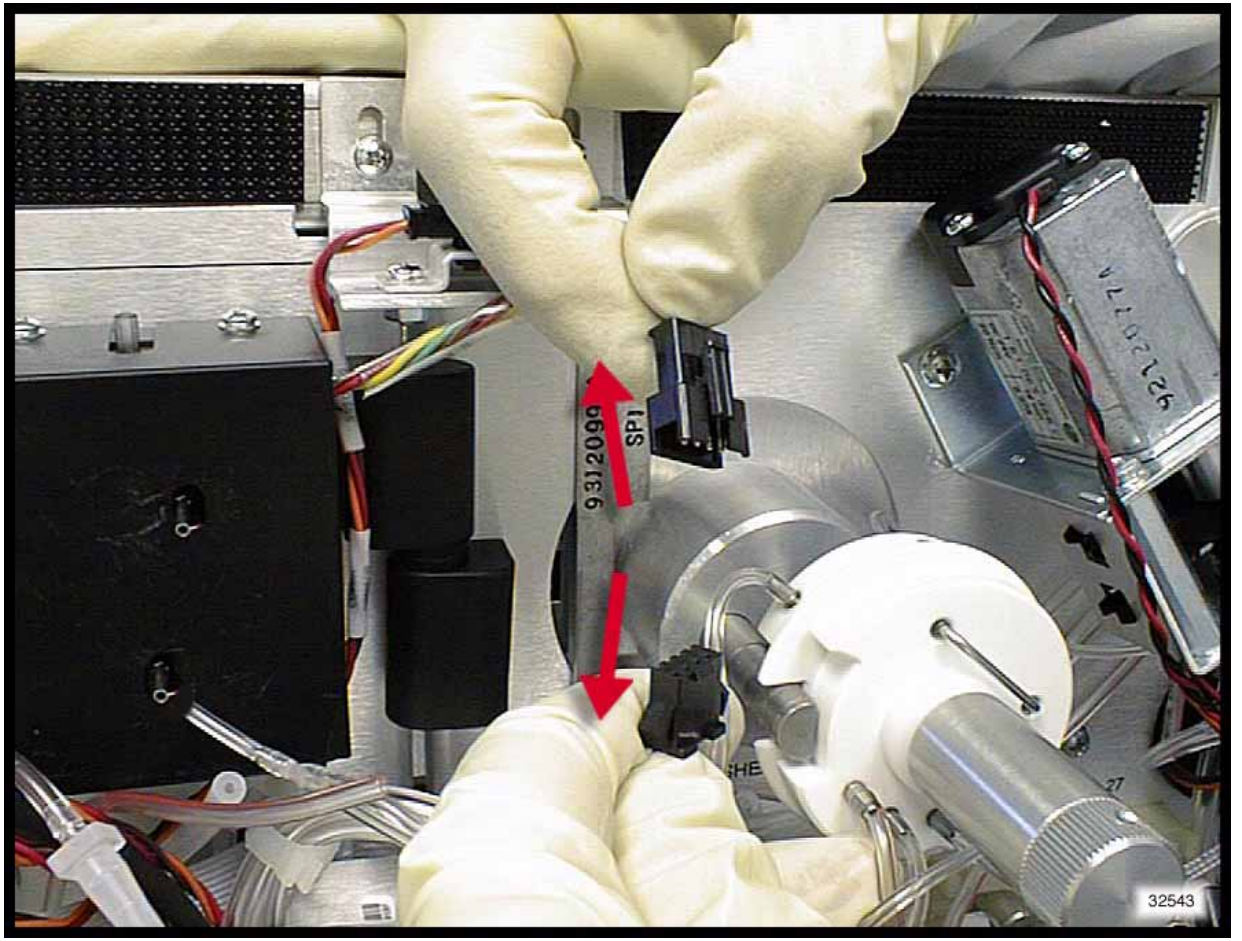
2. Remove tubing from the flow cell: two in front, one on top and one at the base.

Figure 4-52: ***HGB Flow Cell Tubing***



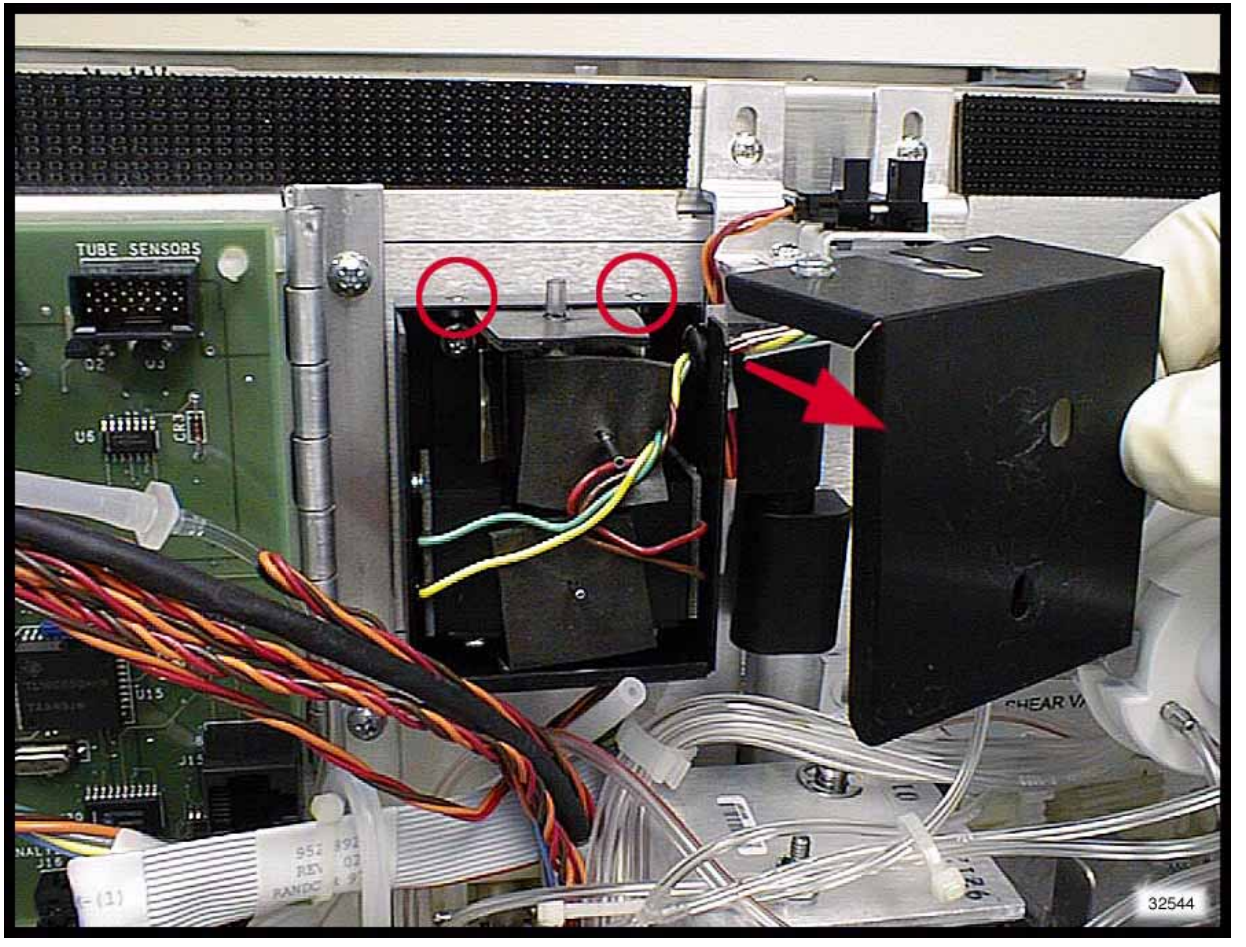
3. Disconnect the inline electrical connection.

Figure 4-53: ***HGB Flow Cell Electrical Connection***



4. Remove the two screws on top of the HGB flow cell to remove the flow cell cover.

Figure 4-54: ***HGB Flow Cell Cover Screws***



5. Remove the two screws at back of the flow cell to remove it.

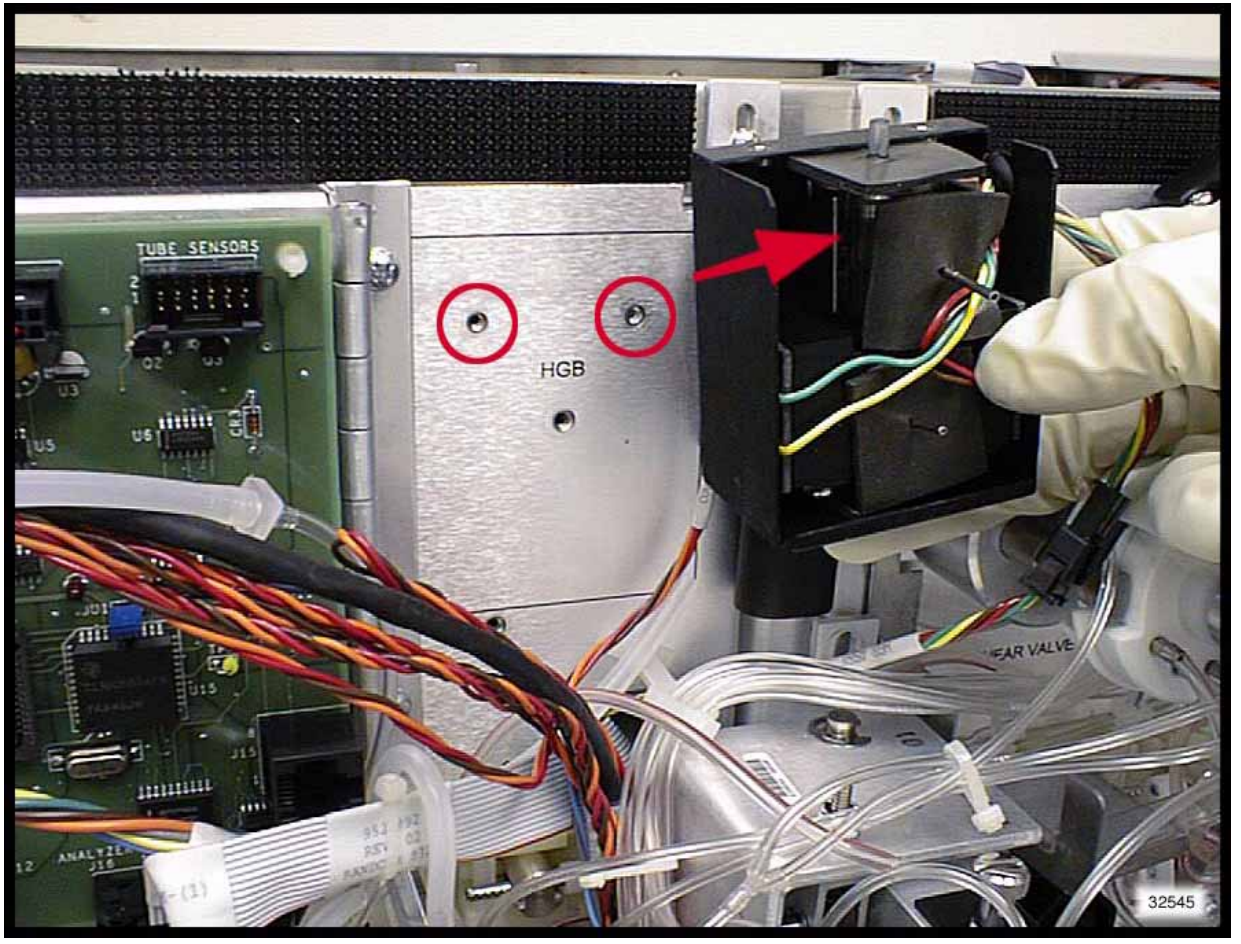
Replacement Procedure

Replace by following the above steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-55: ***HGB Flow Cell Removal***



Sample Loader (RR-10)

Removal Procedure

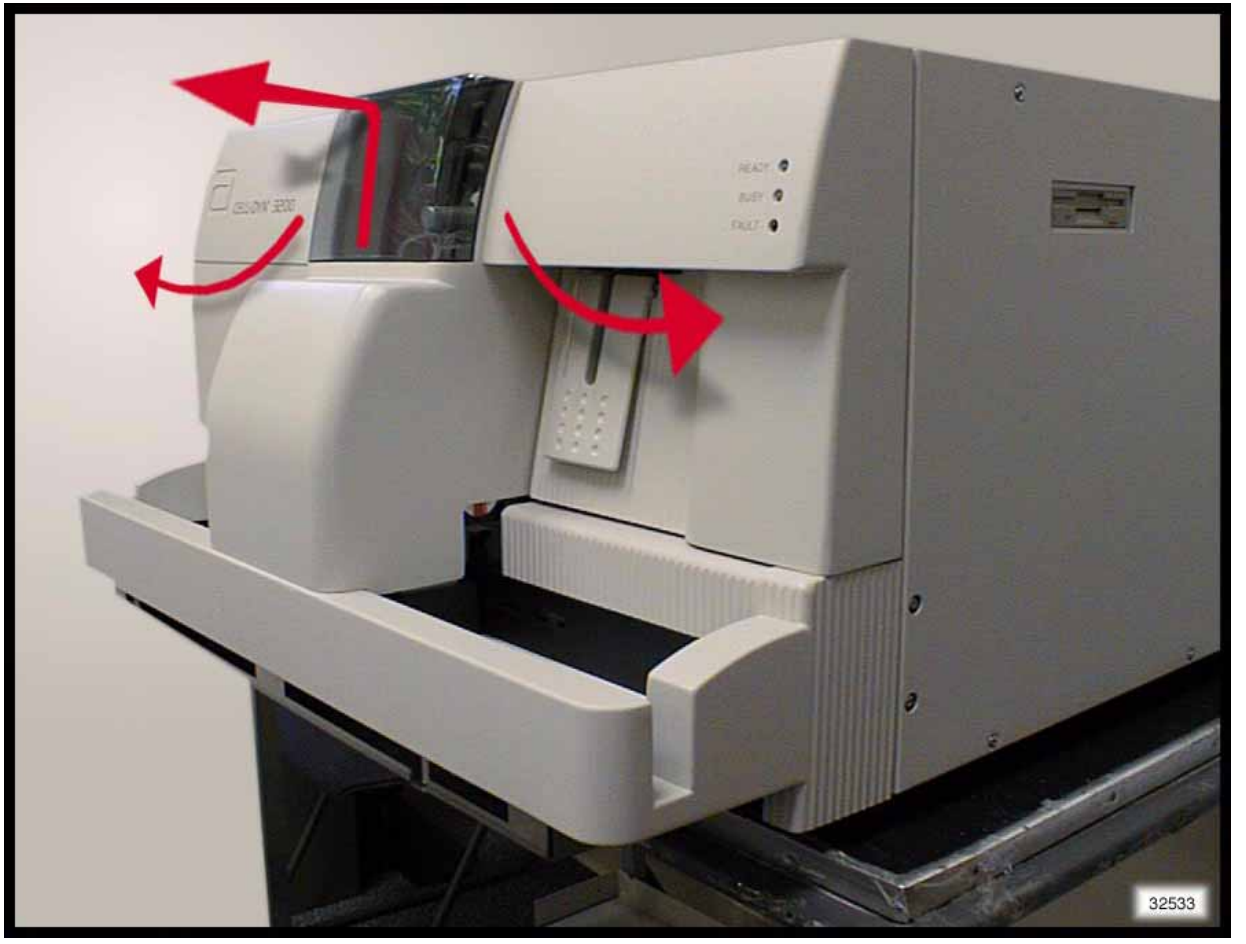
Cell-Dyn 3200 Analyzers built after May 1998 do not require sample loader removal to access front panel.

Follow Part A to access front panel. Follow Parts A and B to remove and replace the loader.

Part A

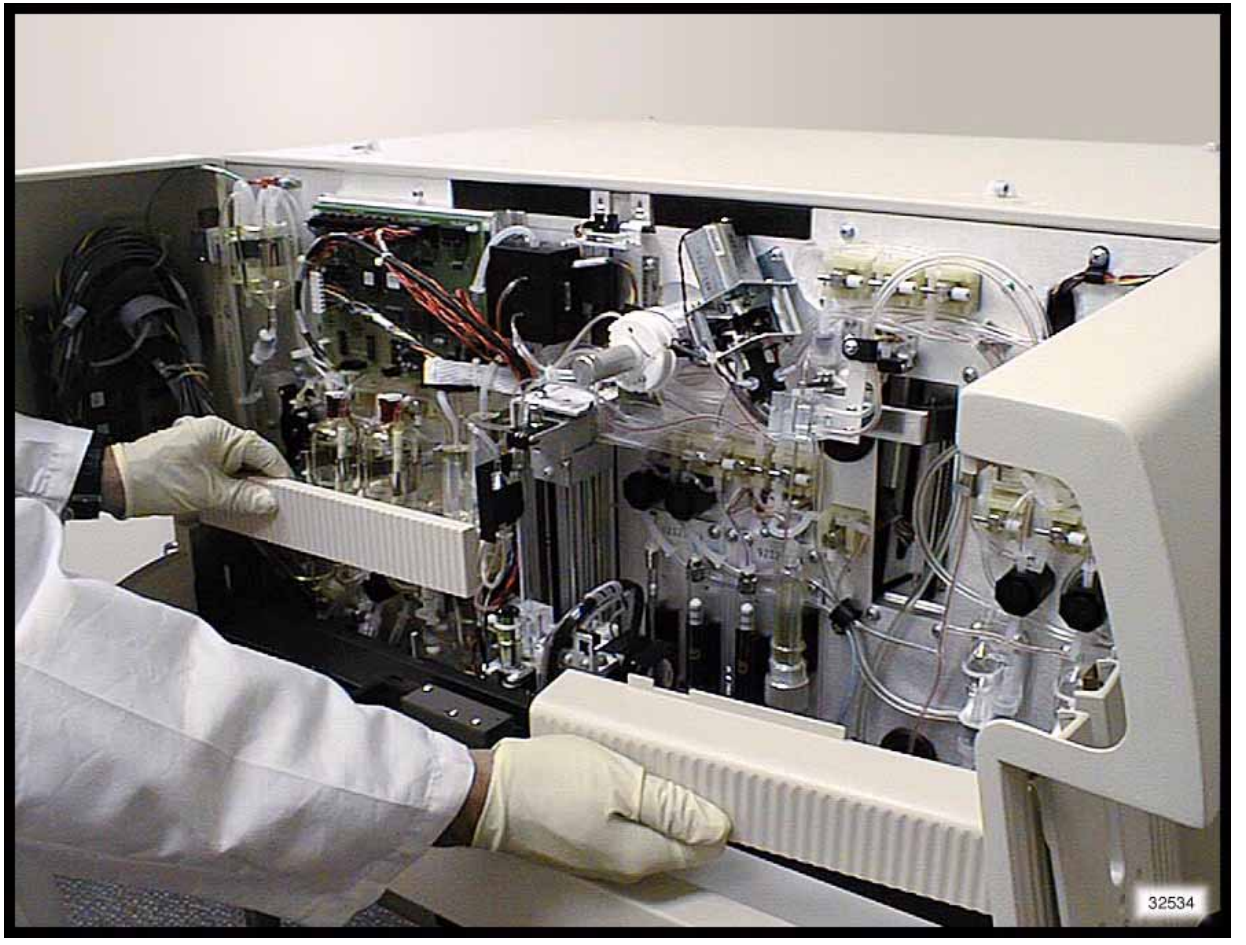
1. With analyzer power off, open the left and right access doors and remove the safety cover.

Figure 4-56: ***Front Access Doors***



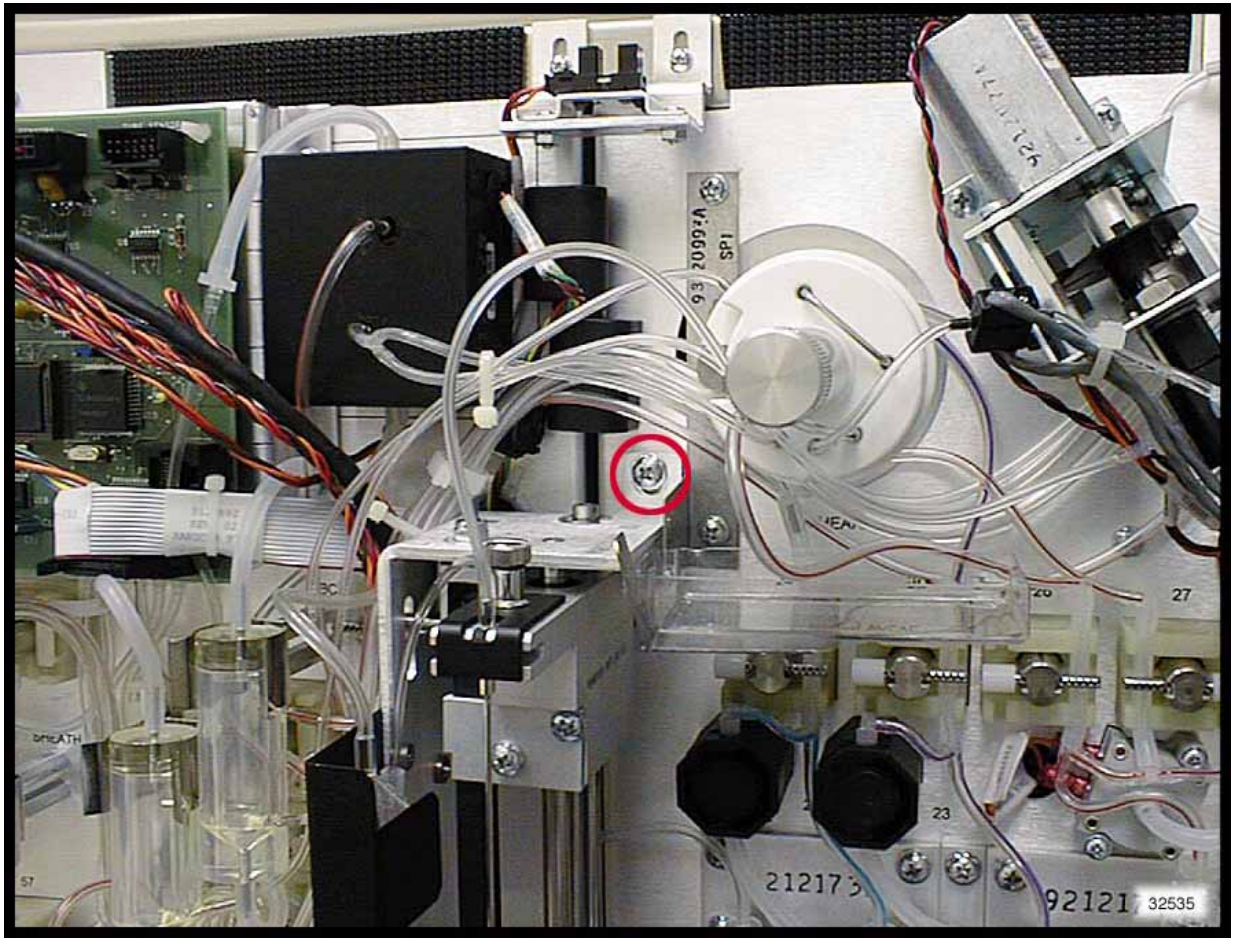
2. Remove the left and right panels from the rear rail of the sample loader.

Figure 4-57: ***Sample Loader Panels***



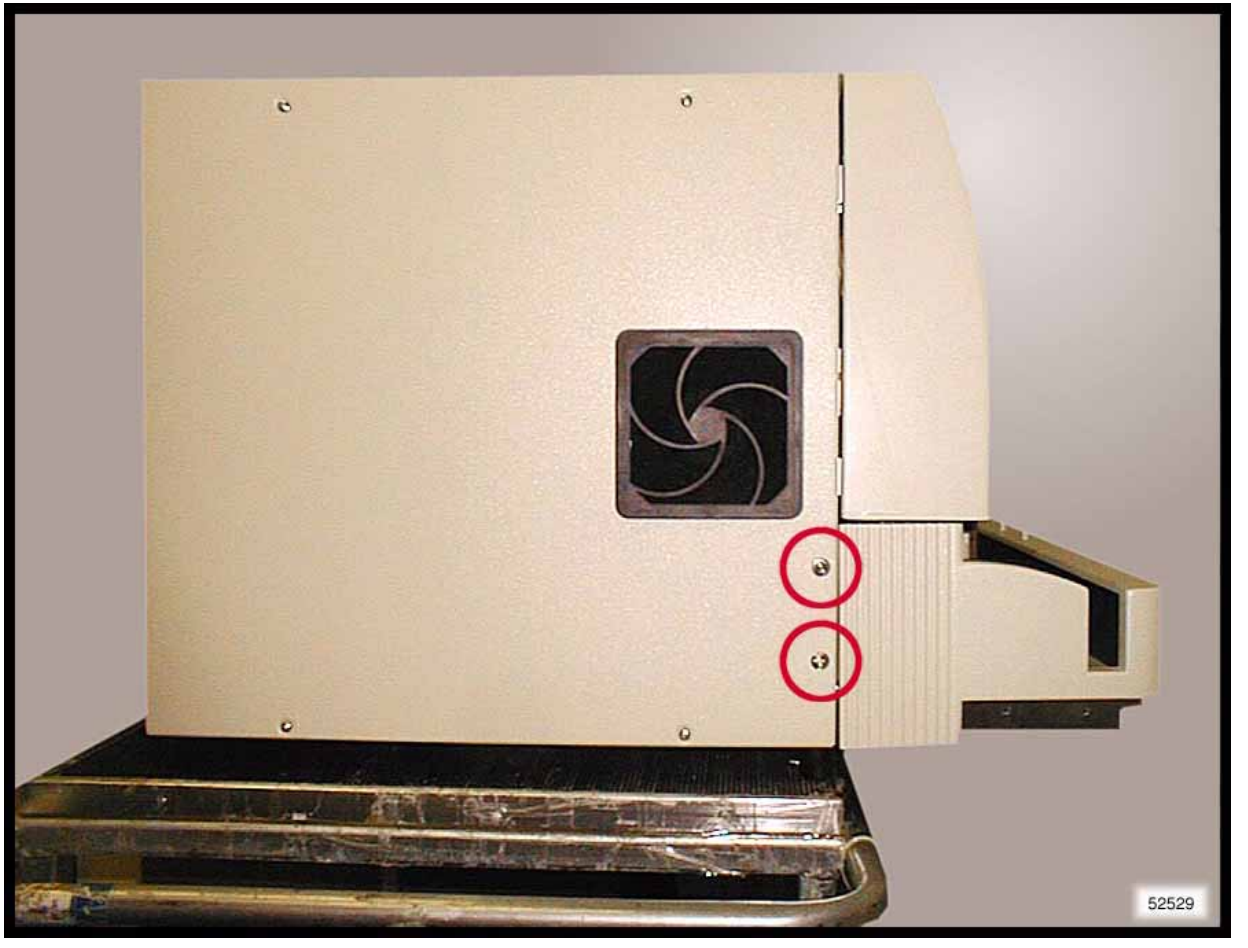
3. Remove the screw at the top of the tower assembly.

Figure 4-58: ***Tower Assembly Screw***



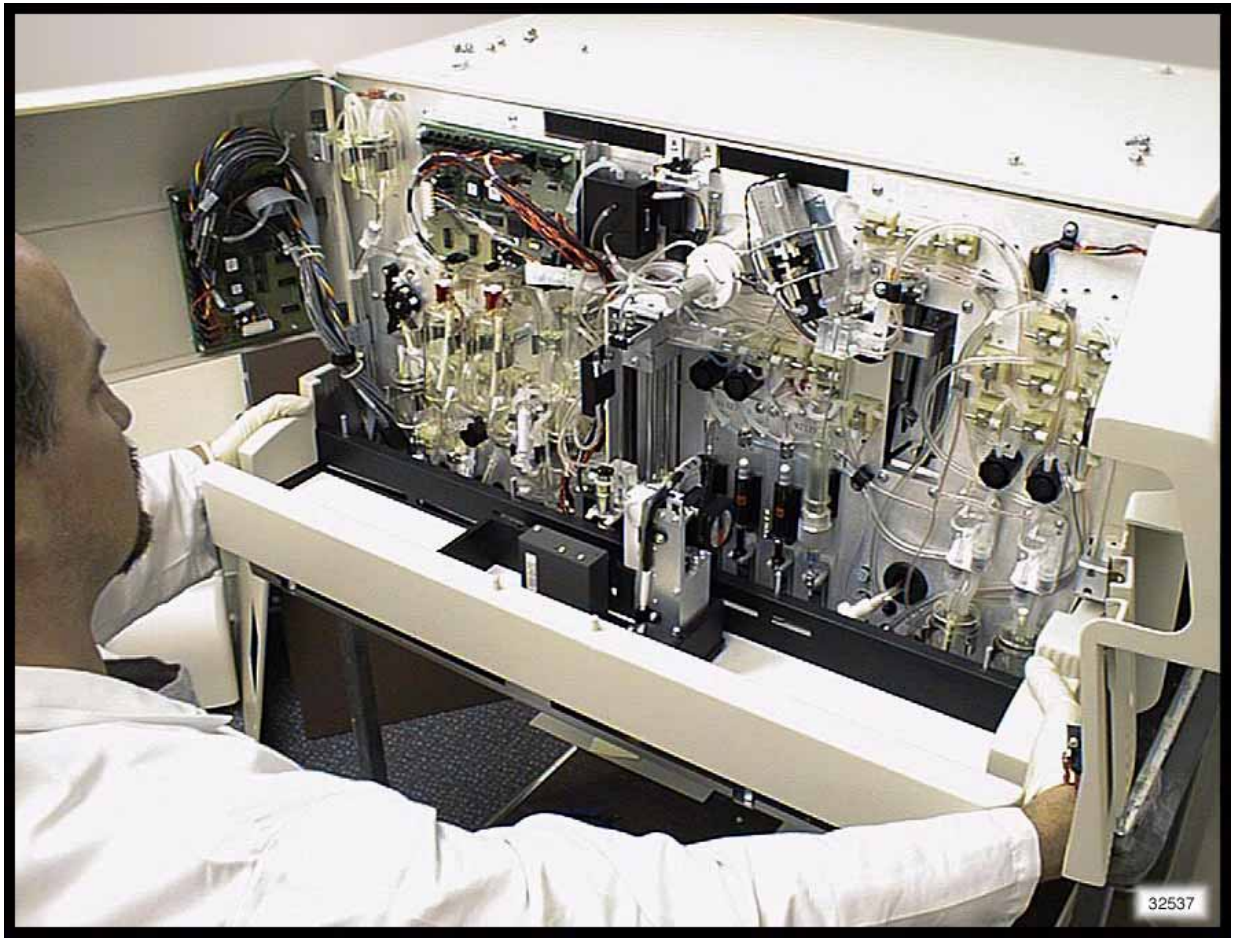
4. Loosen the two screws at each end of the sample loader just one turn.

Figure 4-59: ***Sample Loader End Screws***



5. Lift sample loader and slide forward until it stops (about 2”).

Figure 4-60: ***Slide Sample Loader Forward***

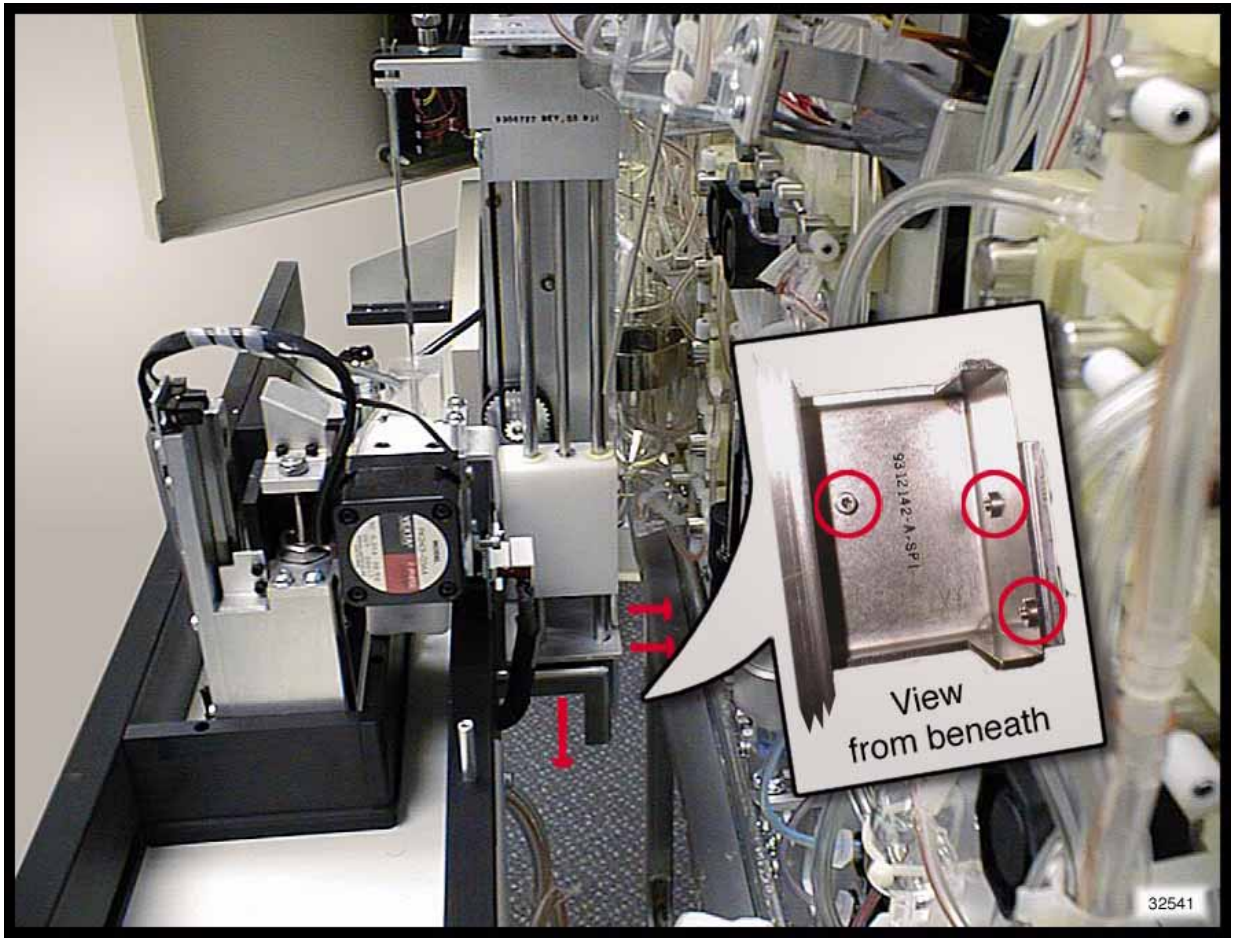


Part B

1. Remove the three hex head screws (7/64” allen) from the base of the tower assembly.

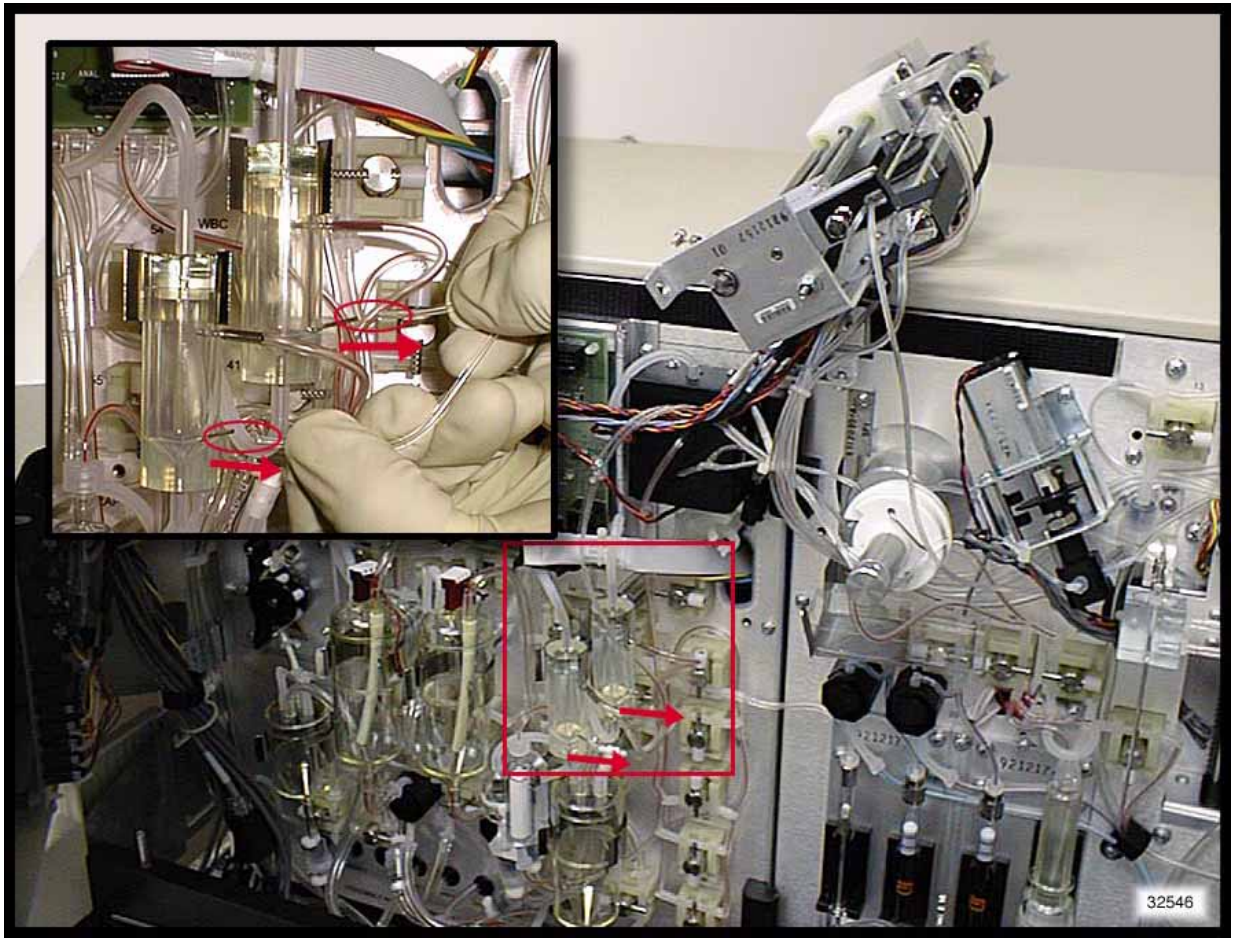
   NOTE: Larger screw at base.

Figure 4-61: ***Tower Assembly Base Screws***



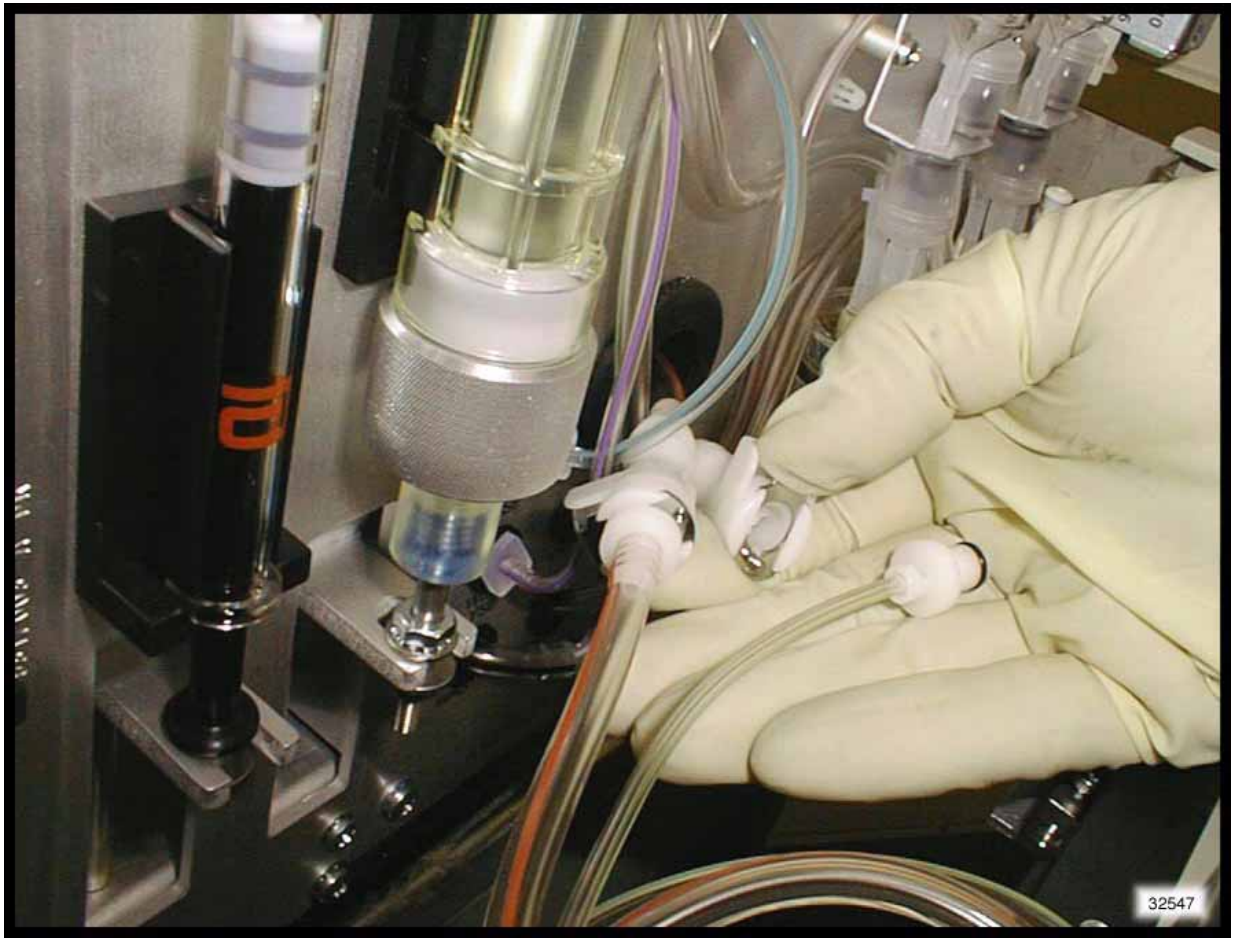
2. Release the clip around the tower assembly tubing. Disconnect the two tubes as shown in the inset. Lay the assembly on top of the instrument.

Figure 4-62: ***Tower Assembly Tubing***



3. Disconnect the vacuum and pressure connections by pressing on the metal clip.

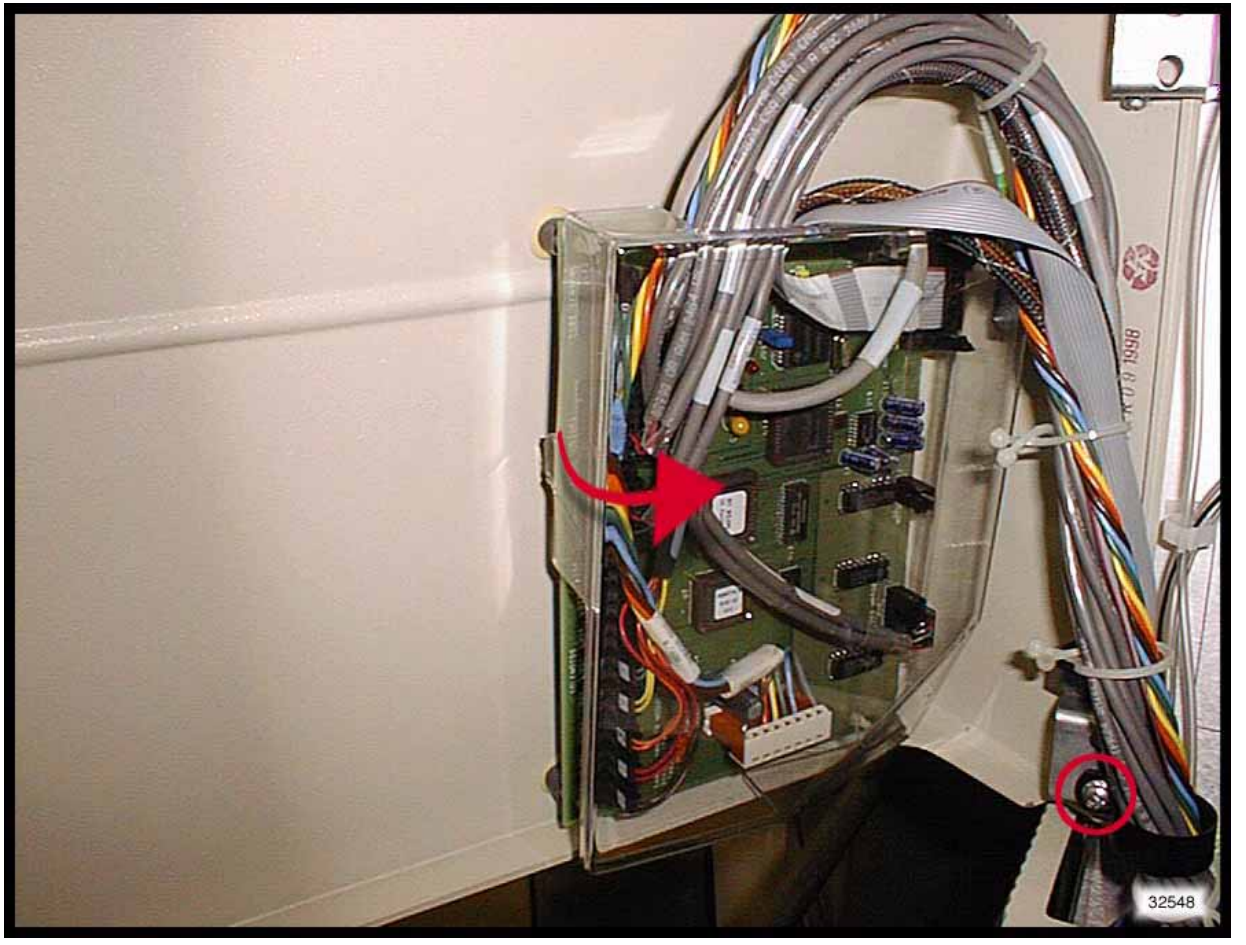
Figure 4-63: ***Vacuum & Pressure Connections***



4. Remove plastic cover from SHM. Disconnect all cables from SHM. Remove cable clamp (1 screw).

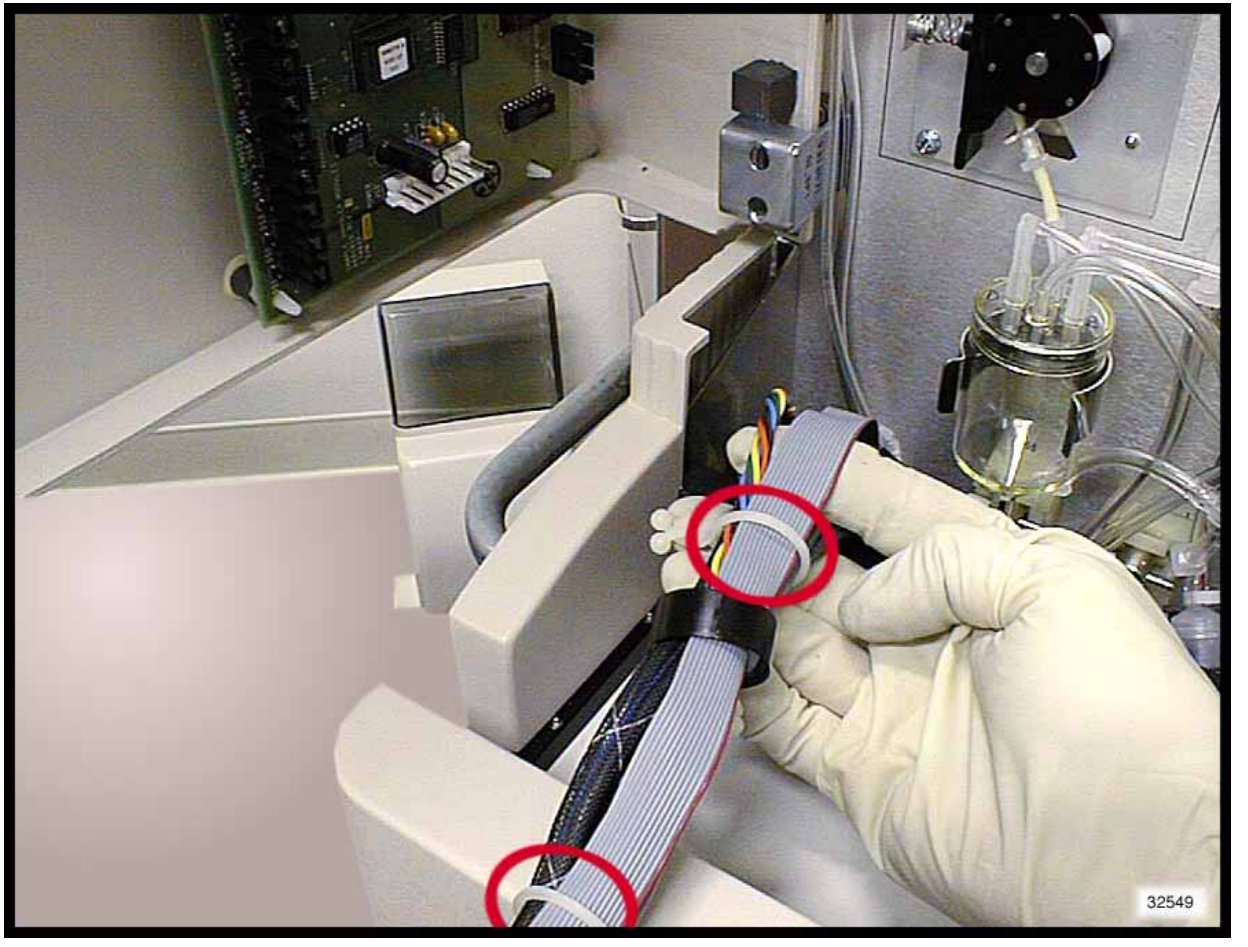
   NOTE: Cables are marked for proper reassembly.

Figure 4-64: ***SHM Cables***



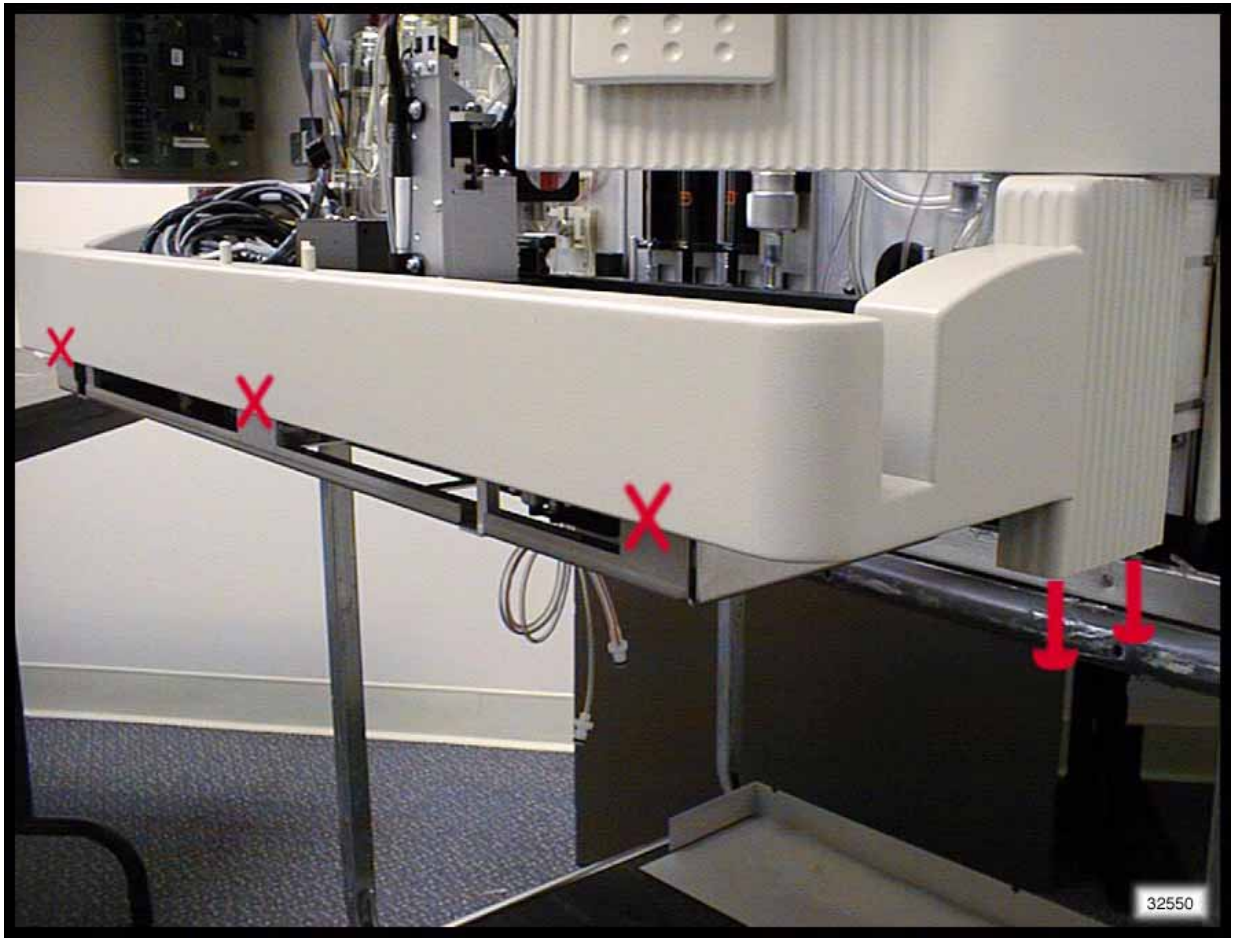
5. Remove cable clamps. Set aside ribbon cable (J16) and multicolored cable (J12).

Figure 4-65: ***Remove Cable Clamps***



6. Remove loader surround cover by loosening front three screws and removing left and right end screws (2 at each end).

Figure 4-66: ***Sample Loader Cover Removal***



7. Remove loader mounting screws (two at each end). Lift loader from brackets.

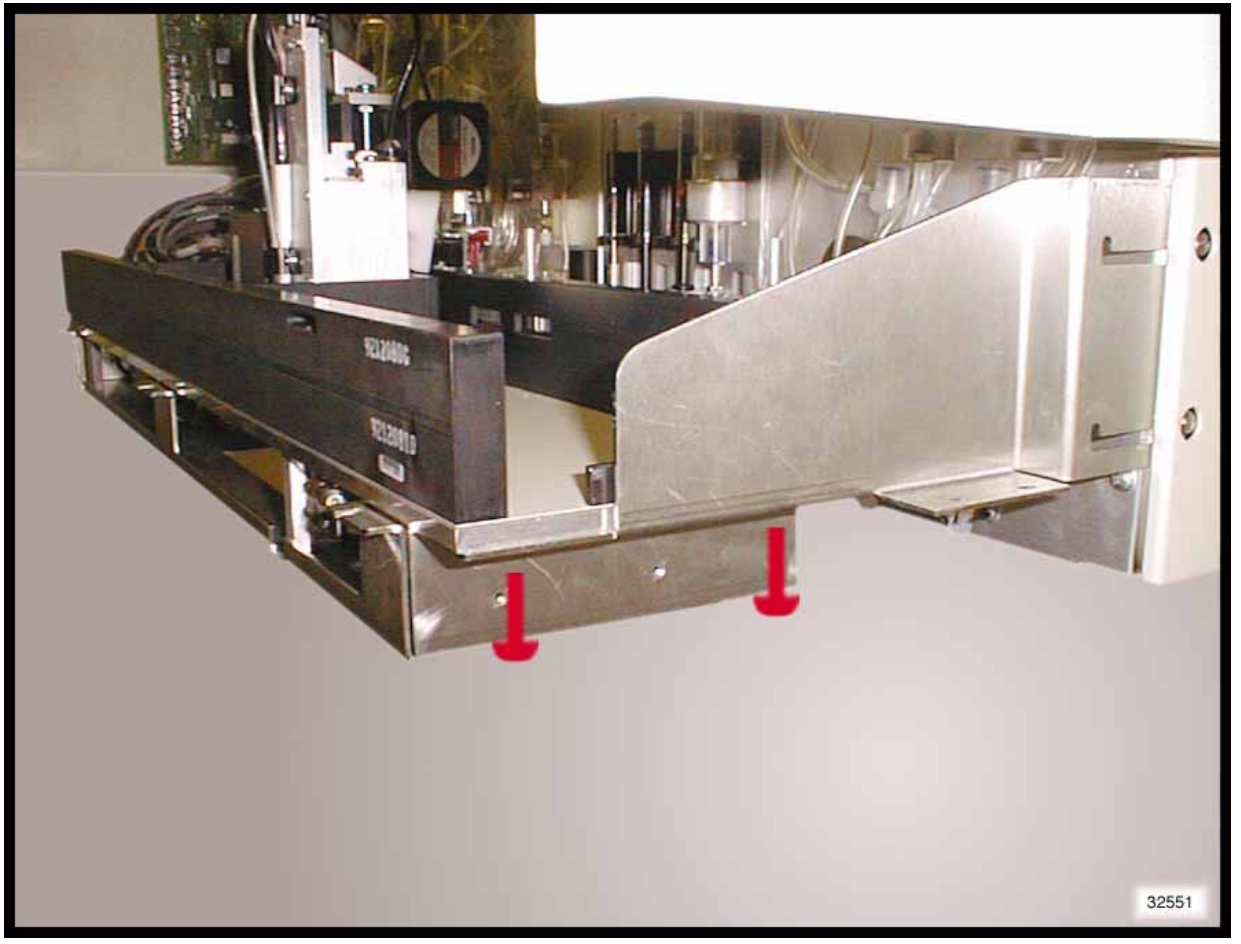
Replacement Procedure

Replace by following the above steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-67: ***Sample Loader Mounting Screws***

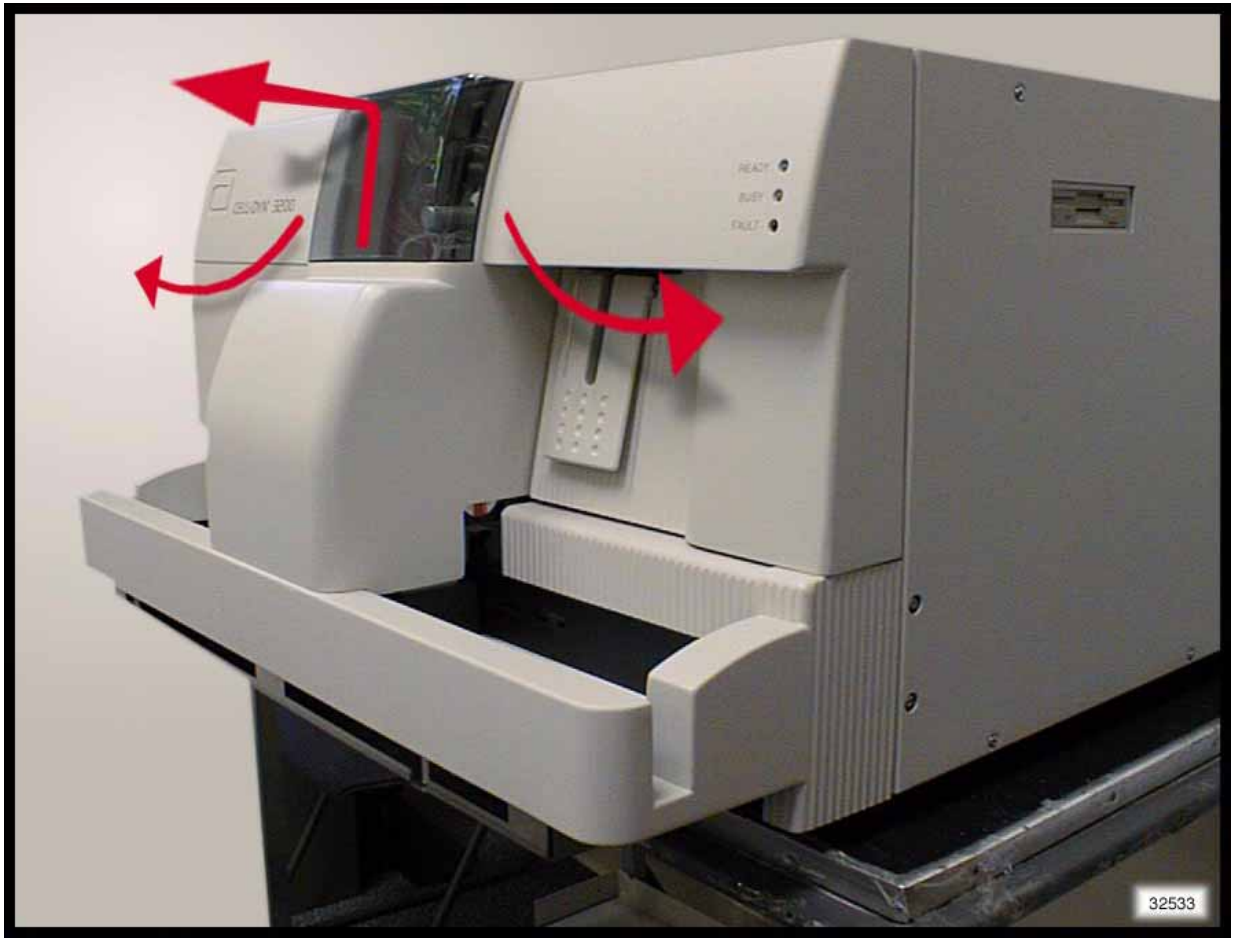


Syringe Driver Assembly (RR-11)

Removal Procedure

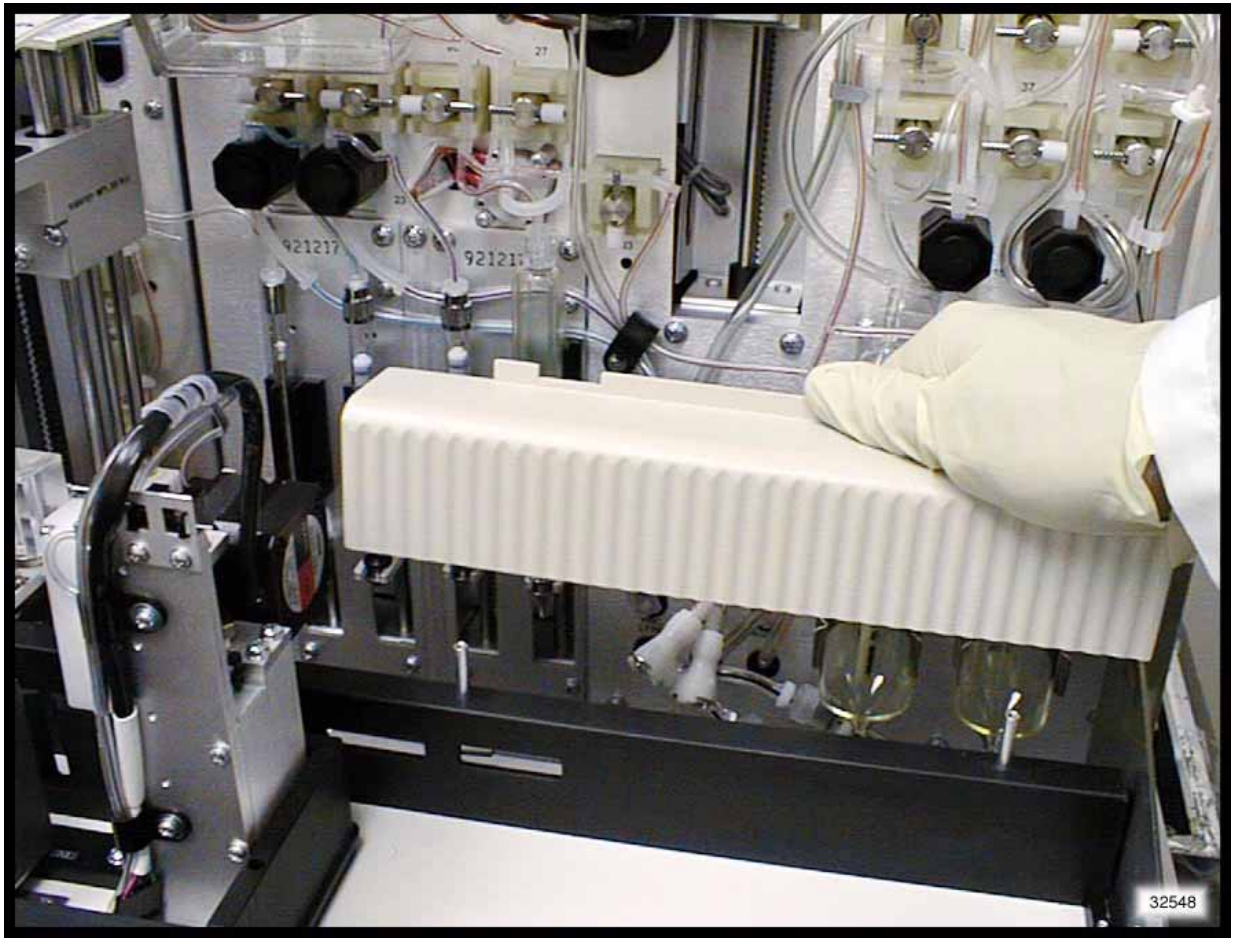
1. With analyzer power off, open the left and right access doors and remove the safety cover.

Figure 4-68: ***Front Access Doors***



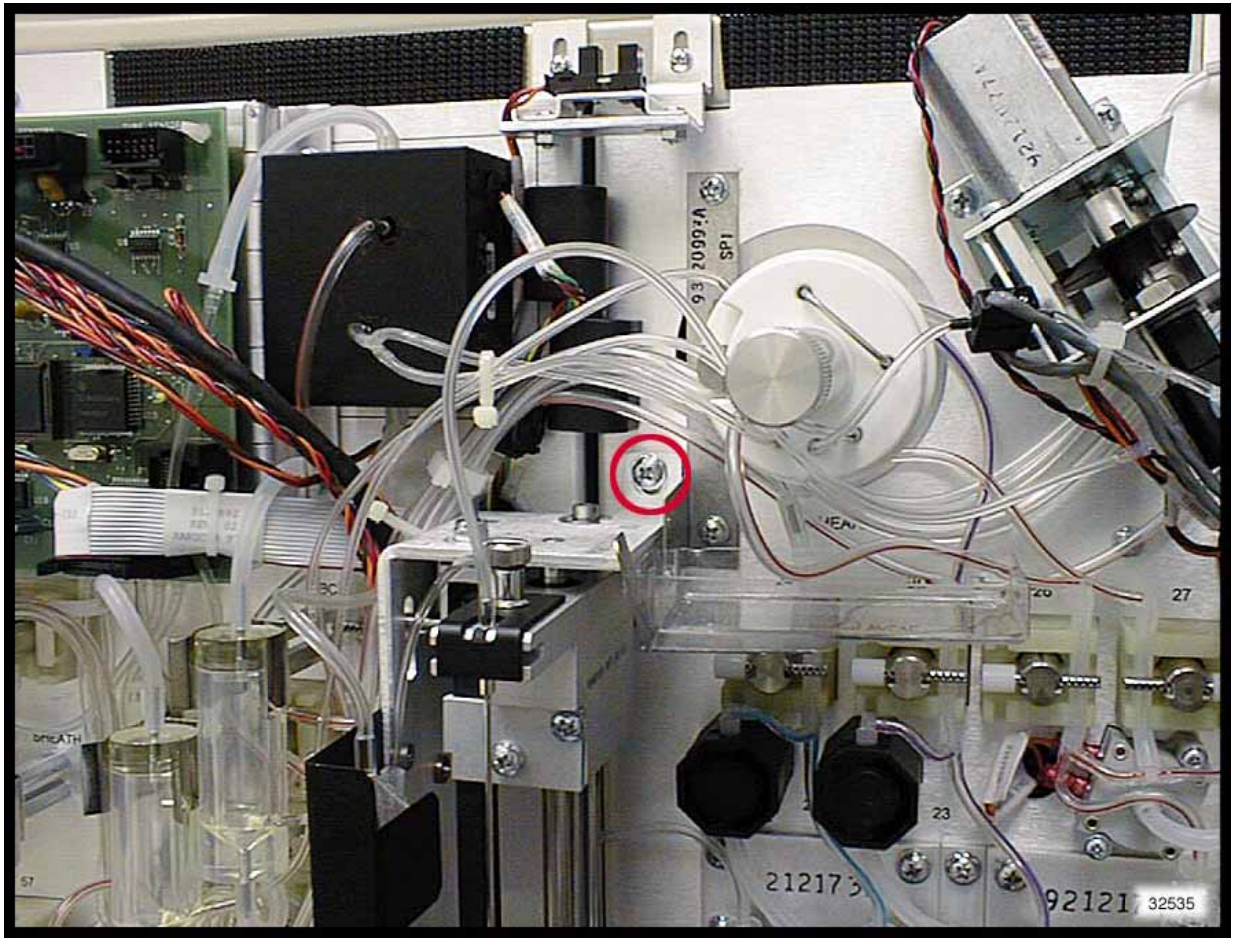
2. Remove the right panel from the rear rail of the sample loader.

Figure 4-69: ***Sample Loader Right Panel***



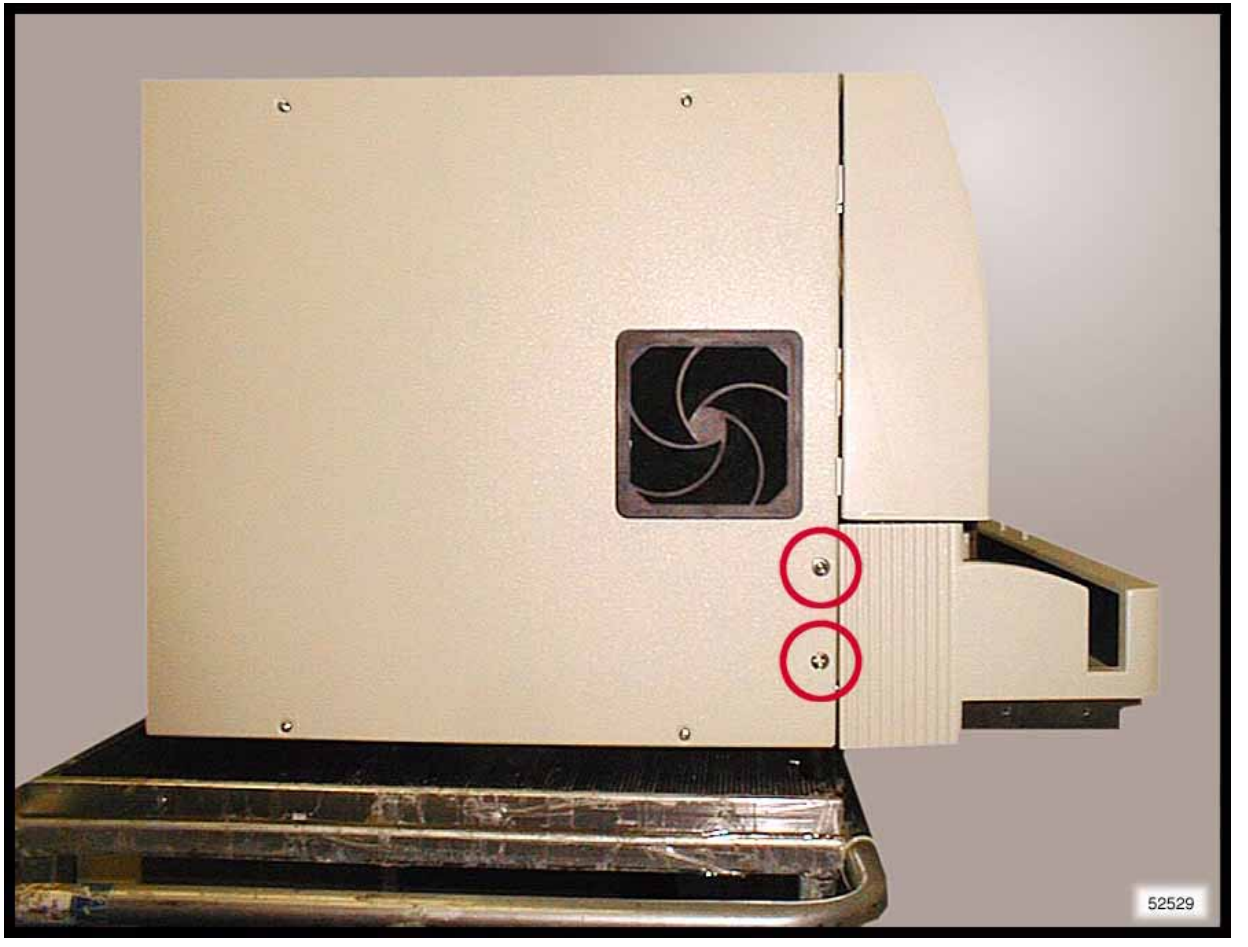
3. Remove the screw at the top of the tower assembly.

Figure 4-70: ***Tower Assembly Screw***



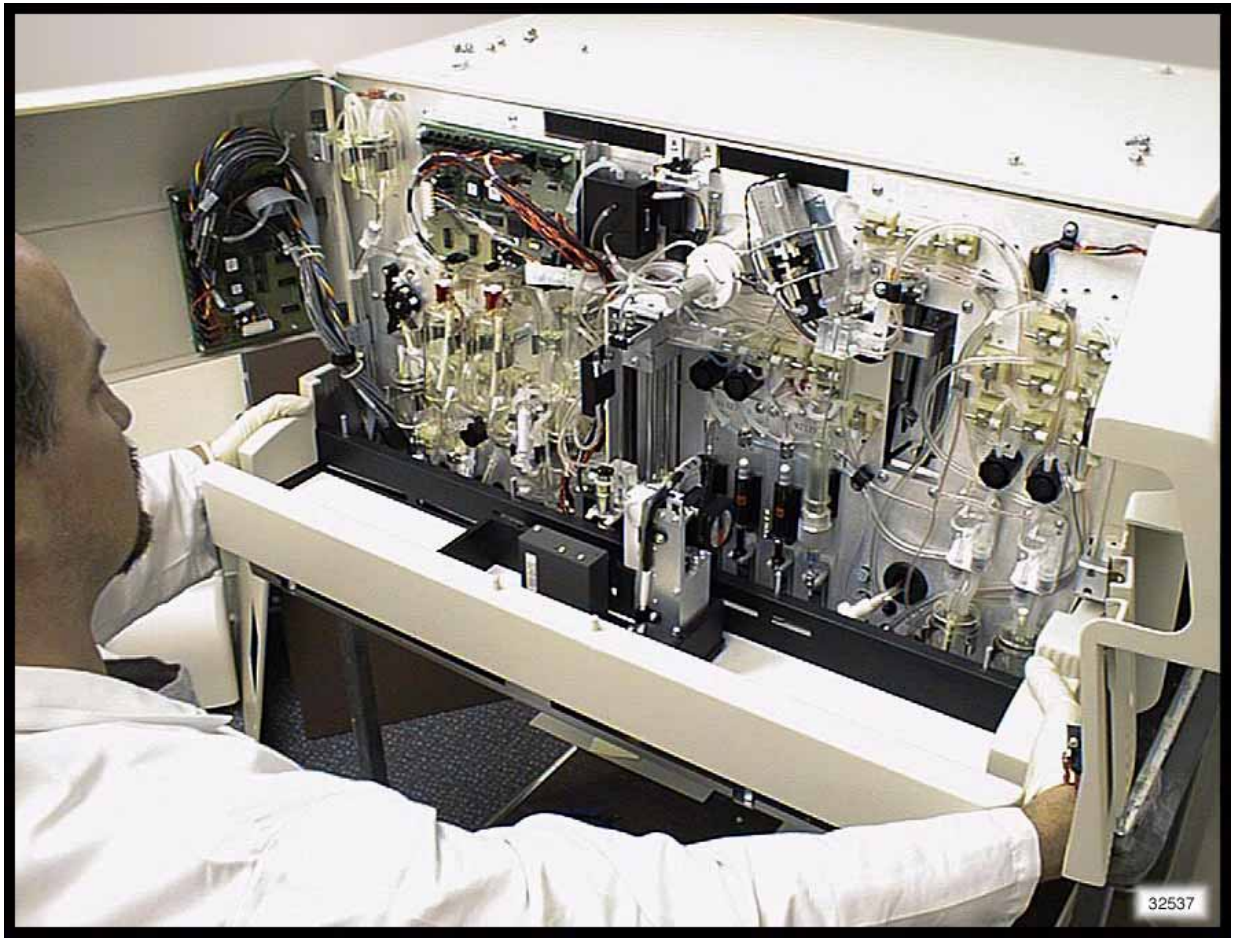
4. Loosen the two screws at each end of the sample loader just one turn.

Figure 4-71: ***Sample Loader End Screws***



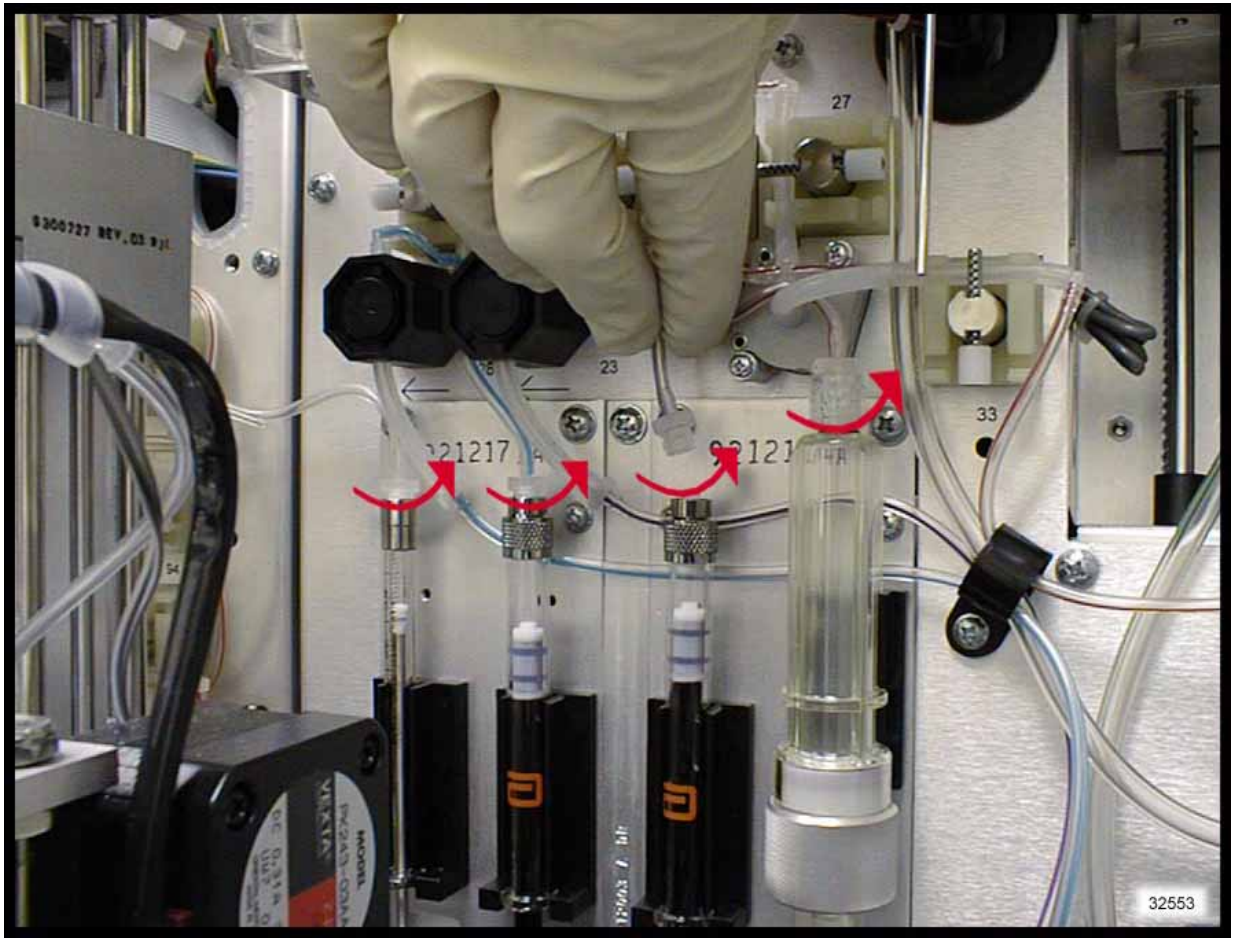
5. Lift sample loader and slide forward until it stops (about 2”).

Figure 4-72: ***Slide Sample Loader Forward***



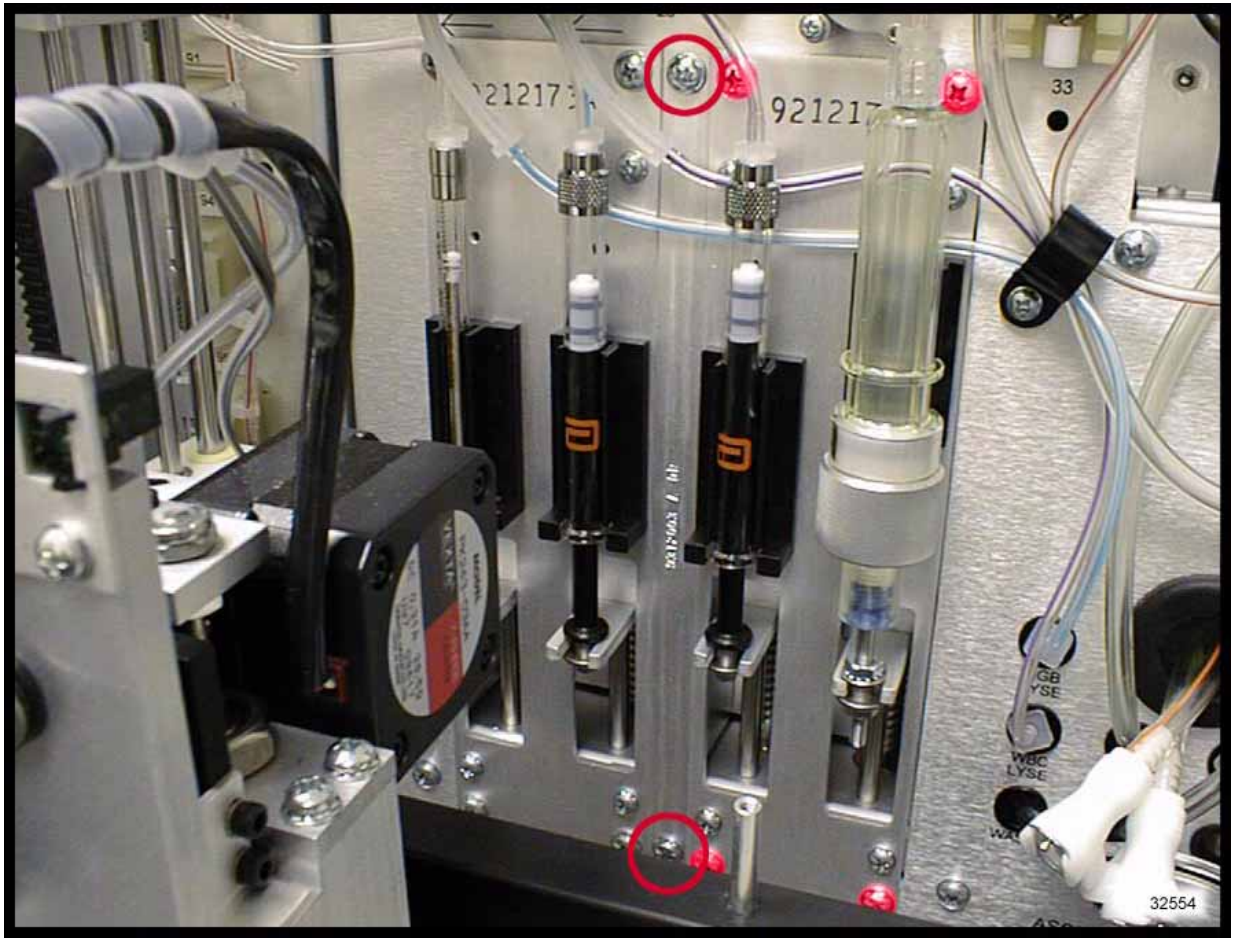
6. Unscrew the luer fittings from top of each syringe.

Figure 4-73: ***Luer Fittings***



7. Remove the four mounting screws for whichever of the two syringe driver assemblies needs replacing. (Right side mounting screws shown here.) Then remove the spacer bar (two screws) between the two syringe driver assemblies.

Figure 4-74: ***Syringe Driver & Spacer Bar***



8. Pull out the drive assembly and disconnect the ribbon cables on each side.

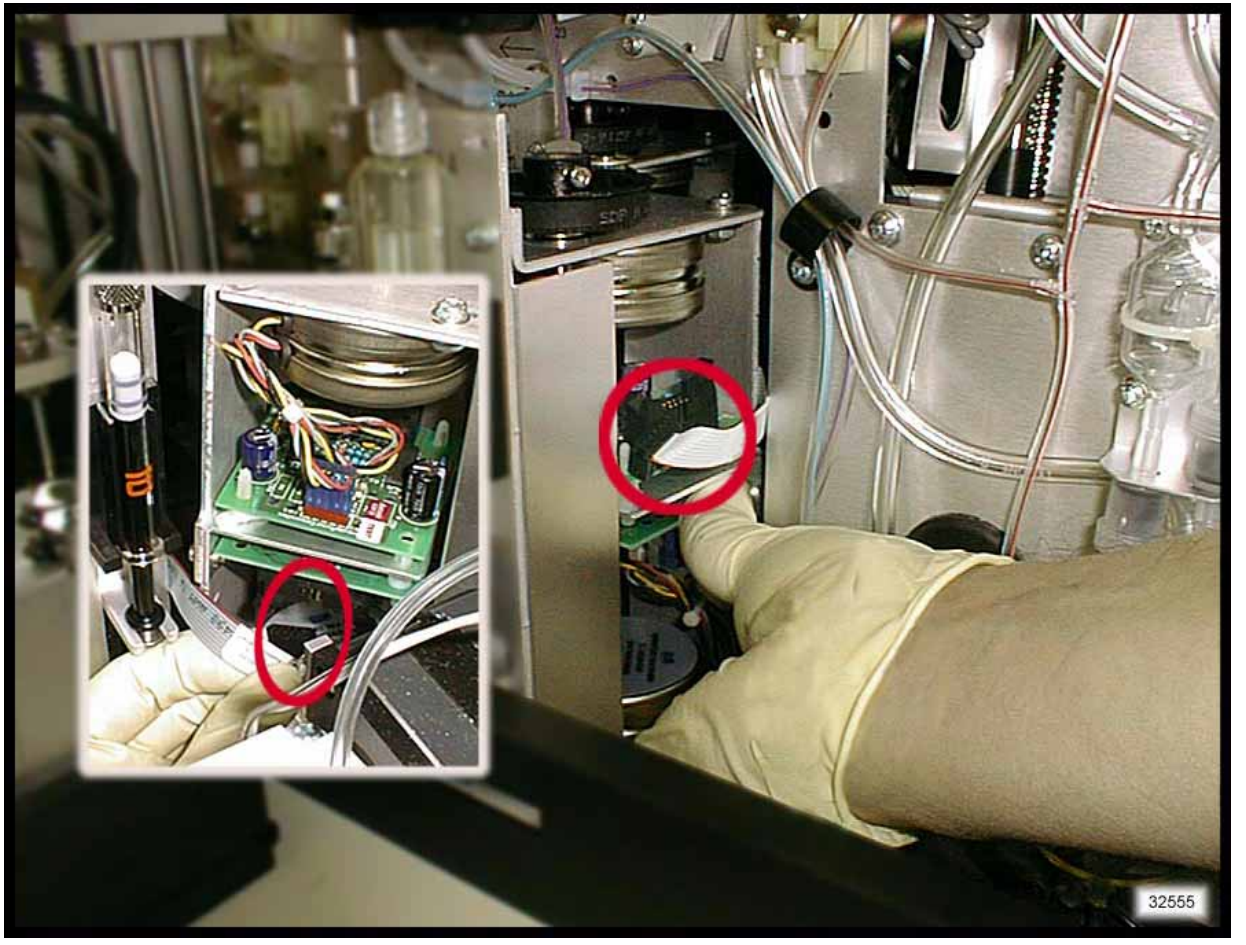
Replacement Procedure

Replace by following the above steps in reverse order.

Verification Procedure

See Verification Matrix, Section 5.2.

Figure 4-75: ***Chopper Driver Ribbon Cables***



5 - Verification Procedures

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5.1 How to Use This Chapter

This chapter contains:

- Verification Matrix containing all VPs required to ensure System integrity after a part is replaced
- Step-by-step illustrated procedures to verify, align, calibrate, and maintain components, assemblies, and functions of the CD3200 Analyzer and Autoloader
  - A list of conditions indicating the need to perform a particular procedure
  - Required tools and materials for each procedure

User and System Conventions

Menu Selections

Menu selections are identified by square bullets. For example:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **TOWER TEST**

or:

   a. Press
      - **ACCEPT**

      to enter the new factors for the parameters that need calibration.

User Entries

User-typed entries are shown in bold, italicized type. For example:

   a. At C:\ prompt type ***CD\RAWFILE***, and press
      - **ENTER**
   b. Type ***DIR***, and Press
      - **ENTER**

5.2 Verification Matrix

REPLACED ASSEMBLY	ASSOCIATED VPs (Perform In Order Listed)
0 Degree Preamp	VP-23, VP-19, VP-26, VP-56, VP-57, VP-58
10 Degree Preamp	VP-23, VP-19, VP-27, VP-56, VP-57, VP-58
90 Degree PMT Preamp	VP-22, VP-23, VP-56, VP-57, VP-58
90 Degree PMT Preamp	VP-22, VP-23, VP-56, VP-57, VP-58
Main Amplifier Module	VP-3, VP-28, VP-23, VP-26, VP-27, VP-56, VP-57, VP-58
Signal Processor Module	VP-23,VP-26, VP-27, VP-56, VP-57, VP-58
CPU/DCM	VP-67, VP-52, VP-2, VP-56, VP-57, VP-58
Flow Control Module	VP-5, VP-9
Vacuum/Pressure Module	VP-4, VP-16, VP-56, VP-57, VP-58
Motor Processor Module	VP-6, VP-7
Power Supply Module	VP-1, VP-56, VP-57, VP-58
Laser Power Supply	VP-46
Solenoid Driver Module SDM/CDM	VP-9
Sample Handler Module #1	VP-31, VP-32, VP-33, VP-34
Sample Handler Module #2	VP-35, VP-36, VP-37, VP-38, VP-39, VP-40, VP-41
HGB Flow Cell	VP-5, VP-56, VP-57, VP-58
Shear Valve Driver Module	VP-7, VP-57
Motor Driver Module	VP-7
Sample Sensor #2	VP-12
Pump Relay Module	VP-17, VP-16
Barcode Reader	VP-10, VP-40
Aspiration Tower	VP-31, VP-32, VP-33, VP-34
Sample Loader	VP-35, VP-36, VP-37, VP-38, VP-39, VP-40, VP-41
Optics Bench	VP-45, VP-22, VP-20, VP-23, VP-24, VP-25, VP-26, VP-27, VP-56, VP-57, VP-58
Laser Head	VP-18,VP-20, VP-23, VP-24, VP-25, VP-26, VP-27, VP-56, VP-57, VP-58
Optics Bench Mirror	VP-19, VP-20, VP-23, VP-24, VP-25, VP-26, VP-27, VP-56, VP-57, VP-58
Optical Flow Cell	VP-19, VP-20, VP-23, VP-24, VP-25, VP-26, VP-27
Syringe Driver Assembly	VP-6, VP-7, VP-56, VP-57, VP-58
Peri-Pump Assembly	VP-6, VP-8, VP-7, VP-56, VP-57, VP-58

REPLACED ASSEMBLY	ASSOCIATED VPs (Perform In Order Listed)
S. Valve Center Ceramic	VP-1, VP-56, VP-57, VP-58
Hard Disk Drive	VP-53, VP-54
Floppy Disk Drive	VP-55

5.3 Verification Procedures

VP-1 System Voltage Verification/Adjustment

Required Tools & Materials:

- # 2 Phillips Screwdriver
- Digital Voltmeter
- Clip Leads
- Potentiometer Adjustment Tool

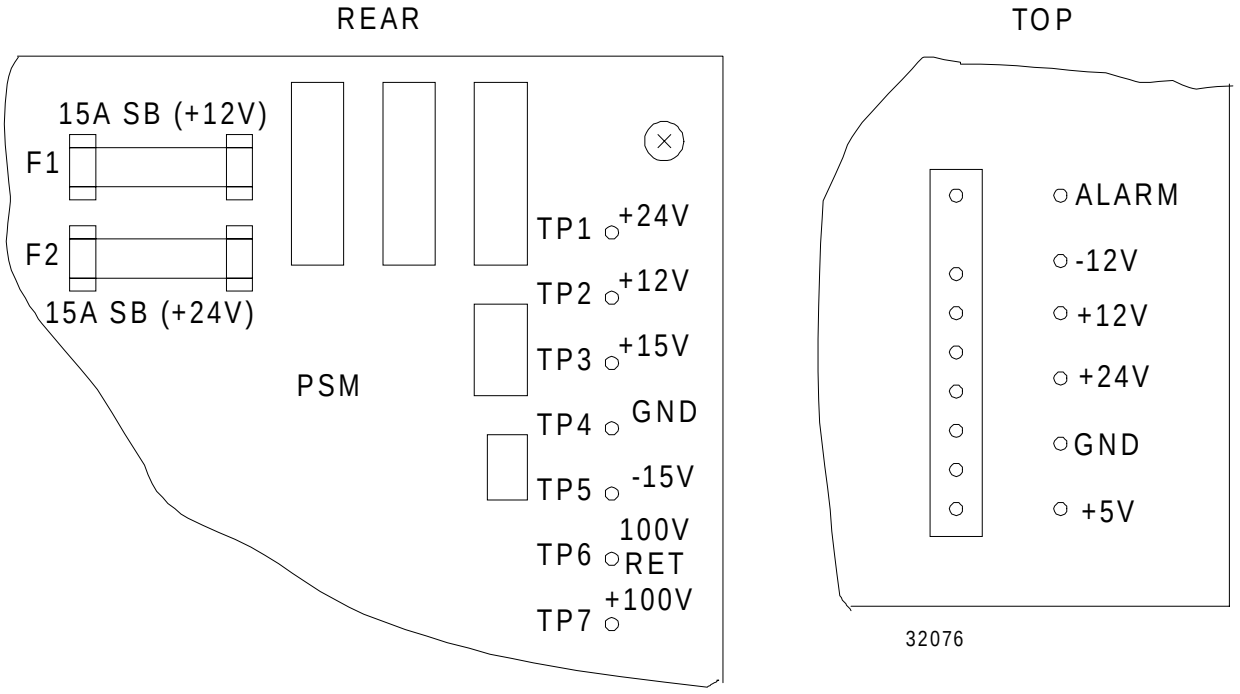
Verification Procedure:

1. Open right side door to gain access to power supply.
2. Refer to Figure 5-1. Connect voltmeter ground lead to TP4 on power supply module.
3. Verify the voltages according to Table 5-1.

Table 5-1 Voltage Specifications

Test Point	Function	Range	Ripple
PSM-TP4	Analog Ground	N/A	N/A
PSM-TP2	+12 VDC UREG	15.0V-19.6V	< 3.0V PP
PSM-TP1	+24 VDC UREG	28.9V-37.7V	< 7.0V PP
PSM-TP7	N/A	N/A	N/A
PSM-TP6	N/A	N/A	N/A
PSM-TP3	+15 VDC	14.6V-15.4V	< 75MV PP
PSM-TP5	-15 VDC	14.6V-15.4V	< 75MV PP
N/A	-12 VDC	11.50-12.50V	<75MV PP
N/A	+12 VDC	11.50-12.50V	<75MV PP
N/A	+5 VDC	5.00V-5.40V	<75MV PP
N/A	+24 VDC REG	24.0-25.0	<75MV PP

Figure 5-1 Power Supply Voltage Testpoints



VP-2 A/D Verification/10 Volt Reference Adjustment

The CELL-DYN 3200 utilizes an A/D converter to convert all critical voltages levels to a 12-bit digital code. This code is read by the computer and these voltages are then displayed on the "VOLTAGE READINGS" screen in "DIAGNOSTICS." The following procedure verifies the accuracy of this A/D Converter by using the A/D to read the 9.901 volt reference generated on the CPU/DCM and is also used to set the level of the 10 volt reference.

Required Tools & Materials:

- # 2 Phillips Screwdriver
- Digital Voltmeter
- Clip Leads
- Potentiometer Adjustment Tool

Verification Procedure:

1. Open right side door to gain access to the CPU/DCM.

2. Locate the CPU/DCM on the right side door and connect the positive lead of the DVM to TP1 and the negative lead to TPAGND.
3. Adjust R4 for a reading of 10.00 volts +/- 0.01V.
4. Move the positive lead to TP3 (9.901V reference) and verify that the meter reading is 9.90 volts +/- 0.03V.
5. Move the positive lead to TP2 (99mV reference) and verify that the meter reading is 0.099 volts +/- 0.003V.
6. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **VOLTAGE READINGS**
7. Press [VOLTAGE READINGS] and observe the “9.901V Reference” on the SPM. Verify by repeatedly pressing the key that the voltage displayed is 9.90 volts +/- 0.05V.

VP-3 MAM Reference Voltage Verification/Adjustment

Required Tools & Materials:

- # 2 Phillips Screwdriver
- Digital Voltmeter
- Clip Leads
- Potentiometer Adjustment Tool or Small Slotted Screwdriver

Verification Procedure:

1. Connect positive lead of DVM to TP2 and negative to TP7.
2. If necessary, adjust R86 for a reading of 10.00 volts +/- 0.01V.

VP-4 VPM Reference Voltage Verification/Adjustment

Required Tools & Materials:

- # 2 Phillips Screwdriver
- Digital Voltmeter
- Clip Leads
- Potentiometer Adjustment Tool

Verification Procedure:

1. Open flow panel door to gain access to the VPM.
2. Connect positive lead of DVM to TP2 (VREF+) and negative to TP1 (VREF-).
3. If necessary, adjust R16 for a reading of 10.00 volts +/- 0.01V.

VP-5 HGB Current Verification/Adjustment

This procedure adjusts the HGB LED current to yield a HGB output voltage of 5.00 volts with the HGB Flow Cell filled with Reference Solution.

Required Tools & Materials:

- None

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **VOLTAGE READINGS**
2. Move the cursor to HGB output, and press
   - **SELECT**
   - **FINISH SELECT**
3. Run one background count to insure that the HGB mixing chamber is full of liquid.
4. Verify that the “HGB OUTPUT” voltage is 5.00 volts +0.2/-0.00 volts. If the voltage is within range, skip steps 5 through 8.
5. Press
   - **MORE**

   to the first diagnostic screen, and press
   - **F12**
   - **F1**
6. Move the cursor to “HGB CURRENT”; enter new setting, and press [ENTER]. A change of 50 will yield a voltage change of approximately 0.3 volts.
7. Press
   - **SET ANALYZER**
   - **RETURN**
   - **RETURN**
8. Press
   - **VOLTAGE READINGS**

   and repeat steps 2 through 8 until the voltage is within specifications.

VP-6 Motor Power Verification

This procedure verifies the winding current of the system stepper motors.

Required Tools & Materials:

- None

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **MOTOR OPERATION**
2. Press
   - **MOTOR PWR CHECKING**

   and wait for the display.

3. Verify each motor meets the specifications shown in Table 5-2.

Table 5-2 Motor Power Specifications

	Phase 0	Phase 0	Phase 0	Phase 3
Motor	**Low**	**Medium**	**High**	**High**
A	1.5-2.1	3.4-4.2	4.9-5.9	4.9-5.9
B	.6-1.2	2.5-3.1	4.2-5.0	4.2-5.0
C	.6-1.2	2.5-3.1	4.2-5.0	4.2-5.0
D	.6-1.2	2.5-3.1	4.2-5.0	4.2-5.0
E	1.5-2.1	3.4-4.2	4.9-5.9	4.9-5.9
G	1.5-2.1	3.4-4.2	4.9-5.9	4.9-5.9

VP-7 Motor Operation Verification

This procedure allows visual verification of the operation of the system motors by running an exercise routine.

Required Tools & Materials:

- None

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **MOTOR OPERATION**
2. Press
   - **EXERCISE MOTORS**

   type the letter of the suspect assembly, and press
   - **ENTER**
3. Verify that the assembly moves smoothly without stopping or jerking.
4. Use the [SHEAR VALVE] and [Y VALVE] keys to exercise the shear valve and Y valve.

VP-8 Motor Homing Verification

This procedure allows visual verification of the homing operation of the system motors by running a homing routine.

Required Tools & Materials:

- None

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **MOTOR OPERATION**
2. Press
   - **HOME MOTORS**

   type the letter of the suspect assembly, and press
   - **ENTER**
3. Verify that the assembly moves smoothly without stopping or jerking.

VP-9 Solenoid Bank Verification

This procedure allows visual verification of the operation of a bank of eight solenoids by running an exercise routine.

Required Tools & Materials:

- None

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **SOLENOID OPERATION**
2. Press
   - **CYCLE BANK**

   type the number of the bank, and press
   - **ENTER**
3. Verify that the solenoids are opened in ascending order.

VP-10 Individual Solenoid Verification

This procedure allows visual verification of the operation of a bank of eight solenoids by running an exercise routine.

Required Tools & Materials:

- None

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **SOLENOID OPERATION**
2. Press
   - **STEP SOLENOID**

   type the number of the starting solenoid, and press
   - **ENTER**
3. Use the “UP/DOWN ARROW KEYS”, and verify that the solenoids are opened when commanded.

VP-11 Bar Code Reader Verification/Alignment

Required Tools & Materials:

- Specimen Tube With Bar Code Label

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **BAR CODE ALIGNMENT**
2. Record the tube bar code number, and place tube at the read station.
3. Press
   - **BAR CODE ALIGNMENT**

4. Verify that the number displayed on the screen matches the recorded number, and the read rate is constant.
5. If necessary, loosen the locking screws, and align the position of the reader until the read rate is constant.
6. Tighten the locking screws and re-verify.

VP-12 Specimen Sensor #2 Verification/Adjustment

Required Tools & Materials:

- CELL-DYN 3200 Diluent/Sheath
- Low Abnormal Control
- DVM with Clip Leads
- Potentiometer Adjustment Tool

Verification Procedure:

1. Remove top and top right covers.
2. Run controls and insure that results are within specifications.
3. Create a specimen dilution using LOW ABNORMAL CONTROL material and CELL-DYN 3200 Diluent/Sheath that gives an RBC value of 0.8MEG/ul, +/- .03.
4. Connect the positive lead of the DVM to TP1 and the negative lead to TP3 on the specimen sensor board.
5. Adjust R1 for a reading of 2.00 +/-0.01 volts.
6. Move positive lead to TP4.

   NOTE: The voltage at TP4 should be <0.50V when air or liquid is passing through the sensor, and >3.00V with the diluted control.
7. Run a background count, and verify a reading of (0.50V.
8. While observing the tubing through specimen sensor #2, place the diluted low control under the open probe, and manually open valve #12 until the dilution is aspirated approximately 2 inches past specimen sensor #2.
9. Verify a reading of >3.00V.
10. Manually open solenoid 13 to remove blood from lines, and run a background count.
11. Run another background count, and verify that the LED on the sensor board does **not** flicker.
12. Disconnect the DVM from the specimen sensor board.

VP-13 LSI Loopback Verification

Required Tools & Materials:

- Loopback Connector PN 9211532

Verification Procedure:

1. Turn power off, install loopback connector at COM1 (top serial connector) on PC module, and power-up and initialize instrument.

2. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **SERIAL TEST**
3. Press
   - **TRANSMIT MESSAGE**

   and verify that the message received matches the message sent: “CELL-DYN serial interface test.”
4. Press
   - **STOP TRANSMISS**
   - **RETURN**
   - **RETURN**
5. Turn power off, and remove loopback connector.

VP-14 MAM & SPM Signal Generator Verification

Required Tools & Materials:

- None

Verification Procedure:

- Not Available At This Time

VP-15 Vacuum & Pressure Retention Verification

This procedure tests the ability of the system to retain the appropriate vacuum and pressure levels. A failure indicates a leak in the system.

Required Tools & Materials:

- None

Verification Procedure:

1. Ensure that the instrument is in the “READY” mode.
2. Verify that off-time of the vacuum pump is 2 minutes or greater between automatic recovery cycles.
3. Verify that off-time of the pressure pump is 2 minutes or greater between automatic recovery cycles.

VP-16 Vacuum & Pressure Level Verification/Adjustment

Required Tools & Materials:

- None

Verification Procedure:

1. Ensure that the instrument is in the “Open Sampler” mode.
2. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **VOLTAGE READINGS**
3. Observe the vacuum and pressure levels and compare with Table 5-3.

Table 5-3 Vacuum & Pressure Specifications

Vacuum/Pressure	Specification
Pressure #1	12.5-13.5 psi
Pressure #2	8.5-9.5 psi
Pressure #3	4.0-4.5 psi
Vacuum #1	12.5-13.5” Hg
Vacuum #2	3.1-3.5” Hg

4. If all the vacuum and pressure levels are within specifications, do not perform steps 5 through 8.
5. Press
   - **MORE**

   to the first diagnostic screen and press
   - **F12**
   - **F1**

   Use the following equation to calculate the new setting(s).

   $$\text{New Setting} = \frac{\text{Target Level}}{\text{Actual Level}} \times \text{Current Setting}$$
6. Move the cursor to the appropriate vacuum(s) or pressure(s), enter new setting(s) and press
   - **ENTER**
7. Press
   - **SET ANALYZER**
   - **RETURN**
   - **RETURN**

   NOTE: If the level is reduced the vacuum or pressure must be bled off to the new level before performing step 8. A count cycle may be used for bleeding.
8. Go to “VOLTAGE READINGS”, and repeat steps 3 through 8 until the level(s) are within specifications.

VP-17 Vacuum & Pressure Recovery Verification

This procedure tests the ability of the vacuum and pressure pumps to return from atmosphere to the appropriate levels. A failure indicates that the pump under test is defective or there is a gross leak in the system.

Required Tools & Materials:

- None

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**

   to VACUUM TEST and PRESSURE TEST.
2. Press
   - **VACUUM TEST**

   and verify that the elapsed time is 4.5 seconds or less.
3. Press
   - **PRESSURE TEST**

   and verify that the elapsed time is 3.5 seconds or less.

VP-18 Laser Replacement/Alignment Procedure

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

Required Tools & Materials:

- # 2 Phillips Screwdriver
- .050 Allen Wrench
- Optics Alignment Kit Cat. #8921183801
- DVM with Clip Leads
- Laser Power Meter

Verification Procedure:

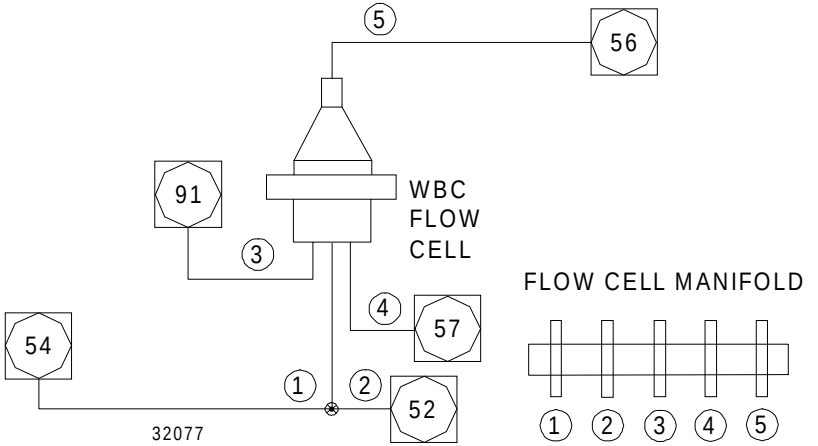
1. Ensure instrument power is off. Remove top cover, both optics covers, and open flow cell access door.

DANGER: HIGH VOLTAGE Assure the power to the instrument is off. A high voltage charge may remain on the laser connector with the power off. Do not touch the male pins. Disconnect the laser connector and short both male pins to the instrument chassis.

2. Disconnect laser connector and short both male pins to instrument chassis.
3. Remove Laser Clamps and replace Laser.
4. Replace clamps and tighten until snug but Laser can still be moved.
5. Move laser body until 3/4 inch extends beyond front laser clamp and rotate laser body until front label is on top.
6. Connect laser connector, ensure laser shutter is closed, turn on power, and prime instrument. Allow a 15-minute laser warm-up period.
7. Refer to Figure 5-4. Mount Power Meter in beam path. Open Laser Shutter and verify a reading of no less than 5 mW.
8. If you have a polarizing filter, skip step 9.
9. Scribe optics bench on right and front sides of beam splitter/polarizer assembly, and remove assembly from 90^{o} path.

10. Place polarizing filter or beam splitter/polarizer in beam path between laser and power meter with beam splitter facing laser.
11. While observing power reading, rotate the laser body clockwise. As power level decreases, change scales as needed.
12. Rotate laser body until power is at minimum on the 20 uW scale.
13. Tighten laser clamps and verify that power level does not change more than +/- 3 uw and remove beam splitter/polarizer from beam path. Laser is now aligned for true vertical polarization.
14. Place alignment post (#9420071) in front tooling hole and center beam on hole using X and Y alignment screws on rear mirror. if alignment post is not available, center beam on cylindrical lens. Placing scotch tape on rear of cylindrical lens will aid in centering beam.
15. Remove alignment post and place power meter behind forward slit.
16. Use X alignment (.050" allen wrench) screw on rear mirror to obtain maximum power through forward slit. Maximum power through slit should be approximately 1/5 of laser power.
17. Use X alignment screw on front mirror to move beam toward alignment hole in center of obscuration bar.
18. Repeat steps 16 through 18 until maximum power is being transmitted through slit and beam is centered horizontally on hole in center of obscuration bar. This may have to be repeated several times to attain proper alignment. Record power level through slit and, if necessary, replace beam splitter/polarizer in normal position.
19. Connect the negative lead of the DVM to TP2 and the positive lead to TP1 on the 0^o photodiode PCB.
20. Refer to Figure 5-2. Manually open solenoid 56 and remove tubing from port #1 on the flow cell distribution manifold.

Figure 5-2 Flow Cell Plumbing.



21. Observe the 90^o slit. When two red images of the flow cell walls appear on the slit, close solenoid 56 and reconnect tubing to port #1.
22. Adjust the Y alignment screw on the front mirror for a minimum reading on the DVM. This reading should be less than 0.300 volts.
23. Adjust the Y alignment screw on the rear mirror until the red images are in the center 1/3 of the 90^o slit.

24. Repeat steps 22 and 23 until the red images are in the center 1/3 of the slit and the DVM voltage is at minimum. The minimum voltage should be less than 0.200 volts.
25. Re-check power transmitted through forward slit. If it has changed, a slight X alignment of the rear mirror is necessary.
26. Replace both optics covers.
27. Perform Optical Flow Cell Verification/Fine Alignment VP-20 and, if necessary, perform Optical Flow Cell Coarse Alignment VP-21, and repeat VP-20.

VP-19 Front/Rear Mirror Replacement/Alignment Procedure

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

Required Tools & Materials:

- # 2 Phillips Screwdriver
- .050 Allen Wrench
- Optics Alignment Kit Cat. #8921183801
- DVM with Clip Leads
- Laser Power Meter

Verification Procedure:

1. Remove top cover, both optics covers, and open flow cell access door.
2. Remove, replace, and secure defective mirror (front or rear).
3. Place alignment post (#9420071) in front tooling hole and center beam on hole using X and Y alignment screws on rear mirror.
4. Remove alignment post and place power meter behind forward slit.
5. Use X alignment (.050" allen wrench) screw on rear mirror to obtain maximum power through forward slit. Maximum power through slit should be approximately 1/5 of laser power.
6. Use X alignment screw on front mirror to move beam toward alignment hole in center of obscuration bar.
7. Repeat steps 4 through 6 until maximum power is being transmitted through slit and beam is centered horizontally on hole in center of obscuration bar. This may have to be repeated several times to attain proper alignment. Record power level through slit and, if necessary, replace beam splitter/polarizer in normal position.
8. Connect the negative lead of the DVM to TP2 and the positive lead to TP1 on the 0^{o} photodiode PCB.
9. Refer to Figure 5-3. Manually open solenoid 56 and remove tubing from port #1 on the flow cell distribution manifold.

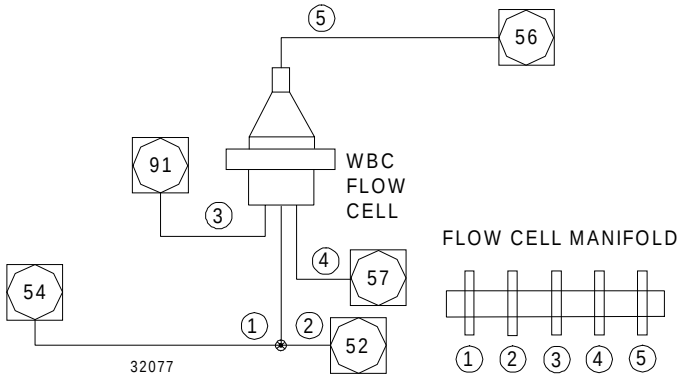


Figure 5-3 Flow Cell Plumbing

10. Observe the 90° slit. When two red images of the flow cell walls appear on the slit, close solenoid 56 and reconnect tubing to port #1.
11. Adjust the Y alignment screw on the front mirror for a minimum reading on the DVM. This reading should be less than 0.300 volts.
12. Adjust the Y alignment screw on the rear mirror until the red images are in the center 1/3 of the 90° slit.
13. Repeat steps 11 and 12 until the red images are in the center 1/3 of the slit and the DVM voltage is at minimum. The minimum voltage should be less than 0.200 volts.
14. Re-check power transmitted through forward slit. If it has changed, a slight X alignment of the rear mirror is necessary.
15. Replace both optics covers.
16. Perform Optical Flow Cell Verification/Fine Alignment VP-20 and, if necessary, perform Optical Flow Cell Coarse Alignment VP-21, and repeat VP-20.

VP-20 Optical Flow Cell Verification/Fine Alignment

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

The alignment of the optical flow cell is one of the most critical alignments performed on the CELL-DYN 3200. It must be optimized so that the instrument can properly perform the WBC 5-Part Differential measurements. However, if this alignment is not really needed, it is best that it not be performed. Therefore, if the instrument is within the prescribed specifications, do not attempt to align the optical flow cell.

Required Tools & Materials:

- # 2 Phillips Screwdriver
- 7.00 µ Diameter Beads, PN 1606004
- CELL-DYN 3200 Diluent/Sheath
- Clean Container

Verification Procedure:

1. Prepare the WBC Beads solution.
   a. Place 2mL of diluent in a clean container.
   b. Add 15 drops of 7.00 µ beads and mix well.
2. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **WBC DATA**

3. Press

   ■ **CALC CV**

4. Place Beads solution under probe and press “TOUCH PLATE” to aspirate Beads and run a count cycle.

5. Refer to Table 5-4 and compare the CVs to those displayed on the screen. If the displayed CVs are less than those from the table, the flow cell does not need alignment.

   NOTE: If any or all of the CVs are out-of-specification, the flow cell must be completely aligned. The 0^o and 10^o channels must be aligned first by adjusting the Y-axis alignment (lower) micrometer and then the 90^o and 90^o depolarized must be aligned by adjusting the X-axis alignment (right) micrometer.

Table 5-4 WBC Mean Channel & CV Specification

Channel	Mean	Range	CV
0^o	35	32-38	<3.5%
10^o	65	60-70	<3.5%
90^o	* Derived From Opti-Cal	+/- 5 Channels	<12.5%
90^o Dep.	* Derived From Opti-Cal	+/- 5 Channels	<12.5%

NOTE: * These values must be obtained from the Beads auto-gain default table, or by performing the Opti-Cal procedure.

6. Open the flow cell access door, located at the top left of the Analyzer.

7. Loosen the locking screw on the lower (y-axis) micrometer, and cover the opening with black cloth to block ambient light.

8. Place the 7.00 µ beads solution under the probe, and press

   ■ **EXTENDED WBC COUNT**

   ■ **START**

   to aspirate the Beads and start the cycle.

9. Observe the 0^o and 10^o display on the left side of the screen. When dots appear on the screen, adjust the lower micrometer until the tightest possible grouping of dots and lowest possible CVs are attained. If the cycle stops before this is accomplished, repeat step 8 and try again.

10. Place Beads solution under probe and “START SWITCH” to aspirate Beads and run a count cycle.

11. Press

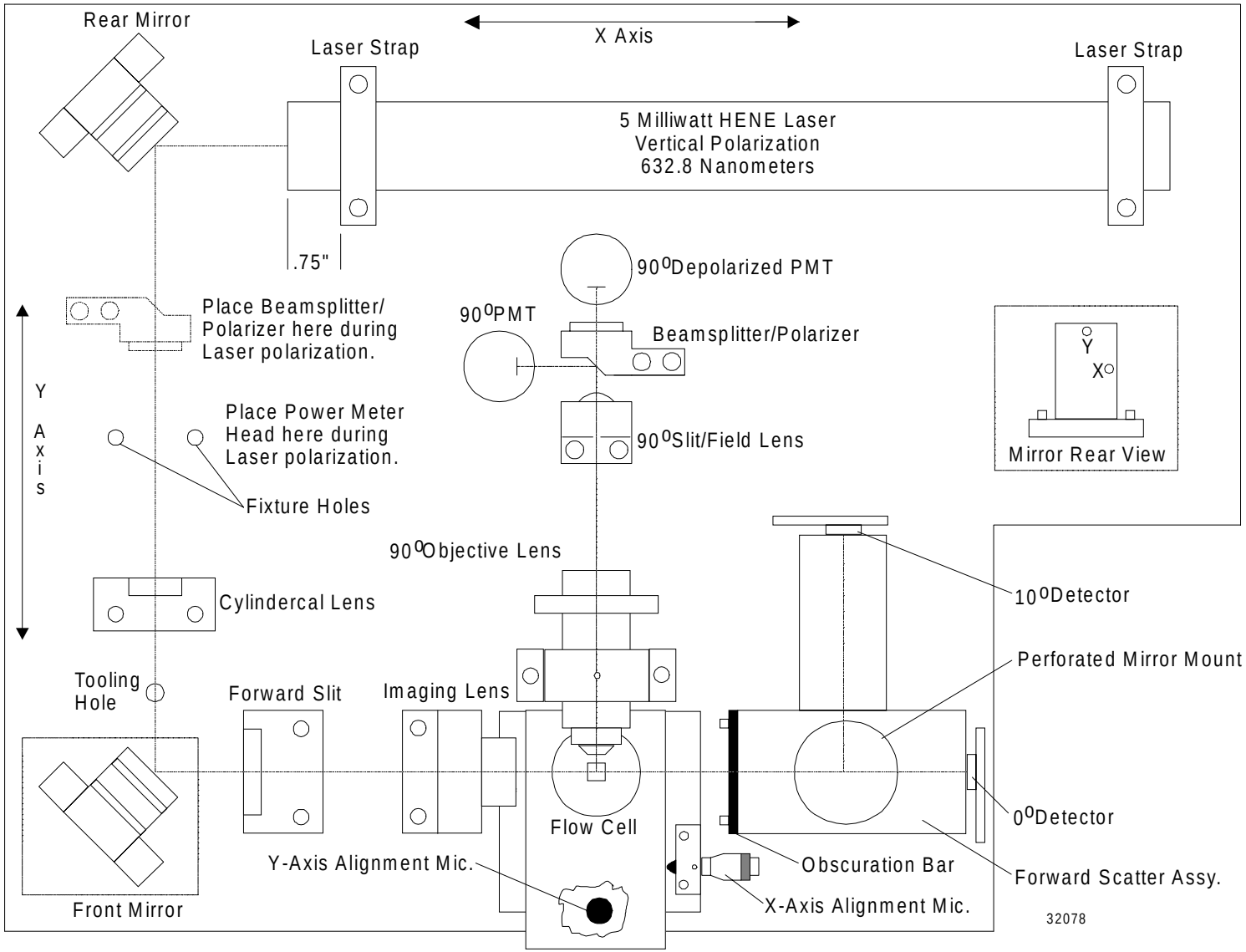
    ■ **CALC CV**

    when the cycle is completed. If the 0^o and 10^o CVs are within specifications, continue with the procedure. If not, repeat steps 8 through 10.

    NOTE: If repeated alignment does not bring the CVs within specifications, further troubleshooting is required to isolate the problem. The first considerations are a contaminated or defective flow cell or a defective laser. The last consideration should be that of a misaligned optical bench, since once properly aligned and secured, none of the assemblies should move under normal conditions.

12. Loosen the locking screw on the right (x-axis) micrometer, and cover the opening with black cloth to block ambient light. Then press the “START” key to aspirate the Beads and start the cycle.
13. Observe the 90^{o} and 90^{o} depolarized display on the right side of the screen. When dots appear on the screen, adjust the micrometer to attain the greatest deflection to the right and up. CVs are not as important as in the 0^{o} and 10^{o} channels.
14. Place Beads solution under probe and press “START SWITCH” to aspirate Beads and run a count cycle.
15. Press the key when the cycle is completed. If the 90^{o} and 90^{o} depolarized CVs are within specifications, the procedure is completed. If not, repeat steps 12 through 15.
16. Tighten the locking screws and record the setting for future reference.
17. Perform PMT Dynode Voltage Verification/Adjustment VP-22.
18. Perform WBC Gain Verification/Adjustment VP-23.
19. Perform WBC OPTI-CAL Verification/Adjustment (VP-24).
20. Perform NOC Gain Adjustment VP-25.
21. Perform RBC/PLT 0^{o} Gain Verification/Adjustment VP-26.
22. Perform RBC/PLT 10^{o} Gain Verification/Adjustment VP-27.

Figure 5-4 CELL-DYN 3200 Optics Bench



VP-21 Optical Flow Cell Coarse Alignment

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

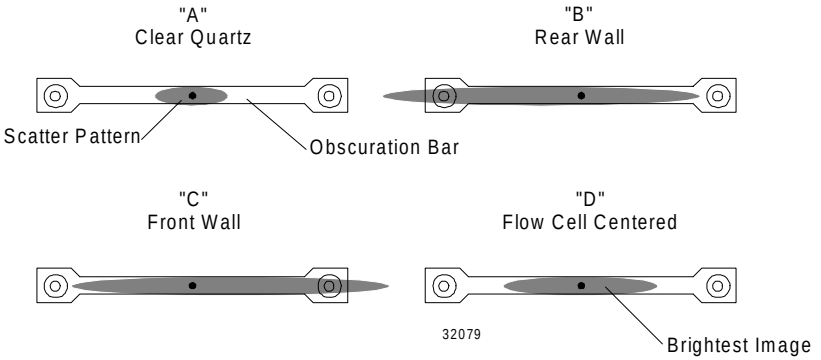
Required Tools & Materials:

- 7.00 µ Diameter Beads
- CELL-DYN 3200 Diluent/Sheath
- Clean Container

Verification Procedure:

1. Prepare the Bead solution.
   a. Place 2mL of diluent in a clean container.
   b. Add 15 drops of 7.00 µ beads and mix well.
2. Remove top cover and flow cell access cover.
3. Loosen the locking screw on the lower (y-axis) micrometer, and back off (CW viewed from top) on the micrometer (Figure 5-5) until the beam is striking the flow cell at a point to the rear of the flow cell channel. The scatter pattern on the obscuration bar should resemble that in Figure 5-5-A. Placing a piece of white paper in front of the obscuration bar will aid in viewing the scatter pattern.
4. While observing the scatter pattern, rotate the micrometer CCW until the pattern of the rear wall of the flow cell channel is observed, and record the micrometer setting (Figure 5-5-B).
5. Continue rotating CCW until the pattern of the front wall is observed, and record the micrometer setting (Figure 5-5-C).

Figure 5-5 Beam Images



6. Rotate the micrometer CW to a setting half-way between those recorded in steps 3 and 4. This should coarsely center the flow cell channel on the beam; the pattern will resemble that of Figure 5-5-D and will be at the brightest level.
7. Cover the opening with black cloth to block ambient light.
8. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **WBC DATA**
9. Press
   - **CALC CV**

10. Place Beads solution under probe and press “START SWITCH” to aspirate Beads and run a count cycle.
11. If there is data in both displays, perform the fine alignment procedure VP-20. If there is no data in either display, Repeat steps 5 through 9.

VP-22 PMT Dynode Voltage Verification/Adjustment

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

Required Tools & Materials:

- # 2 Phillips Screwdriver
- 3/16” Allen Wrench
- 7.00 µ Diameter Beads, PN 1606004
- CELL-DYN 3200 Diluent/Sheath
- Clean Container

Verification Procedure:

1. Prepare the WBC Beads solution:
   a. Place 2 mL of diluent in a clean container.
   b. Add 15 drops of 7.00 µ beads and mix well.
2. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **WBC DATA**
3. Press
   - **CALC CV**
4. Place Beads solution under probe and press “START SWITCH” to aspirate Beads and run a count cycle.
5. Observe the mean channel values for the 90^{o} and 90^{o} depolarized channels, and refer to Table 5-4. If the displayed mean channel values are within specifications and the recorded gain settings are less than 2500, the dynode voltages need not be adjusted and the procedure is completed. If either of the above are out-of-range, the dynode voltage(s) for the channel(s) must be adjusted.
6. Remove the top cover from the analyzer, and locate the PMT preamplifiers on the right side of the optical bench. The board on the left is for the 90^{o} channel and the board on the right is for the 90^{o} depolarized channel. R11 adjusts the dynode voltage on both boards.
7. Press
   - **MORE**

   to first Diagnostics Screen, and press
   - **F12**
   - **F1**
   - **SET POINT ENTRY**

8. Move cursor to “WBC 90D”, enter 2000, and press “ENTER.” Move cursor to “WBC 90DP”, enter 2000, and press “ENTER.”
9. Press
   - **SET ANALYZER**
   - **RETURN**
   - **RETURN**
   - **MORE TO**
   - **WBC DATA**
10. Cover optical bench with black cloth to block ambient light.
11. Place the 7.00 µ beads solution under the probe, and press
    - **EXTENDED WBC COUNT**
    - **START**

    to aspirate the Beads and start the cycle.

    NOTE: Both 90^{o} channels are extremely sensitive to ambient light. The black cloth must remain in place when adjusting the dynode voltages.
12. Observe mean channel value on right display and adjust R11 on 90^{o} preamplifier (left PCB) until the displayed values approximate the specifications shown in Table 5-1. (Note that this is a coarse preliminary manual adjustment that will be more finely tuned with the auto gain circuitry.)
13. Repeat steps 11 and 12 for the 90^{o} depolarized preamplifier (right PCB).
14. Press
    - **DIAGNOSTICS**
    - **MORE**
    - **VOLTAGE READINGS**
15. Verify that both dynode voltages are less than 9.00 (900 volts). Dynode voltages greater that 900 volts indicate a problem, and the problem must be isolated and corrected before continuing.

VP-23 WBC Gain Verification/Adjustment

The following procedure verifies, and if necessary, adjusts the gain of the WBC channels using 7.00 µ beads as a reference material.

There are two modes available for adjusting the WOC gain - “ENTER SETTING” and “AUTO GAIN ADJUSTMENT.”

In the “ENTER SETTING” mode the proper gain setting is calculated manually and then entered. Use the following equation when using this mode.

$$\text{New Gain Setting} = \frac{\text{Desired Mean Channel}}{\text{Present Mean Channel}} \text{X Present Setting}$$

In the “AUTO GAIN ADJUSTMENT” mode Beads is run on the analyzer and the new gain setting is calculated and entered automatically. We will use this mode, if necessary, in the following procedure.

Required Tools & Materials:

- 7.00 µ Diameter Beads
- CELL-DYN 3200 Diluent/Sheath

- Clean Container

Verification Procedure:

1. Prepare the WBC Beads solution:
   a. Place 2mL of diluent in a clean container.
   b. Add 15 drops of 7.00 µ beads and mix well.
2. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **GAIN ADJUSTMNTS**
3. Press
   - **VERIFY GAINS**
   - **WBC GAINS**
4. If necessary, change the Mean Channel Numbers to the desired values (Table 5-1) and press
   - **ENTER**
5. Place Beads solution under probe, press
   - **START**

   and press the “START SWITCH” to aspirate Beads and run a count cycle.
6. If the Mean Channel Numbers are within specifications, skip steps 7 through 12.
7. Press
   - **RETURN**

   to access “AUTO GAIN ADJUSTMNT
8. Press
   - **AUTO GAIN ADJUSTMNT**
   - **WBC GAINS**
9. If necessary, change the Mean Channel Numbers to the desired values (Table 5-1) and press “ENTER.”

   NOTE: You must run Beads twice in order to set gains. The first run is needed to calculate new settings, and the second is to verify the settings.
10. Place Beads solution under probe, press
    - **START**

    and press the “START SWITCH” to aspirate Beads and run a count cycle.
11. Place Beads solution under probe and press “START SWITCH” to aspirate Beads and run a count cycle to verify.
12. Press
    - **Y**
    - **ENTER**

    to save new gain settings.

VP-24 WBC OPTI-CAL Verification/Adjustment

The following procedure verifies, and if necessary, adjusts the gain of the WBC 90^{o} and 90^{o}D channels using OPTI-CAL as a reference material. It also determines and stores the Beads reference channels to be used for reference after an OPTI-CAL gain adjustment.

Required Tools & Materials:

- 7.00 µ Diameter Beads, PN 1606004
- CELL-DYN 3200 Diluent/Sheath
- Clean Container
- OPTI-CAL

Verification/Adjustment Procedure:

1. Insure Channels 1 through 4 offset voltages are less than 2 volts.
2. Insure Laser power is greater than 5mw and less than 7mw.
3. Insure Channel WOC gain settings are less than 2500.
4. Insure Dynode voltages are less than 900 volts.
5. Insure the CVs on all 4 channels are: 0^o < 3.5%, 10^o < 3.5%, 90^o < 12.5%, 90^oD < 12.5%.
6. Insure the Auto Gain function has been run and the gains have been set to the following:

   0^o = 35 +/- 3, 10^o = 65 +/- 5.
7. From Main Menu, press
   - **DIAGNOSTICS**
   - **F12**
   - **F1**
8. Press
   - **BEADS/BLOOD COMPARE**
9. Press
   - **CELL REGION**
10. Change window settings to conform to the OPTI-CAL assay sheet.
11. Press
    - **RETURN”**
12. Toggle the “BLOOD/BEADS” key to blood.
13. Run the OPTI-CAL 3 times and record the mean channel values for GRANs on 90^o and 90^oD on each run.
14. Compute the average mean channel for 90^o and 90^oD for the three runs.
15. Compare the average to the Gran mean channel location given in the OPTI-CAL assay sheet. If it is within specifications, skip steps 16 through 20.
16. Calculate the new gain values for 90^o and 90^oD, use the following equation:

    X (Y/Z)

    Where:

    X = Current Gain Value.

    Y = Mean Channel Value from Assay Sheet.

    Z = Current Mean Channel from Step 14.
17. Press
    - **RETURN**
    - **SET POINT ENTRY**

18. Enter the new value for 90^{o} gain and press
    - **ENTER**
19. Enter the new value for 90^{o}D gain and press
    - **ENTER**
    - **SET ANALYZER**
    - **RETURN**
20. Press
    - **BEADS/BLOOD COMPARE**

    and repeat steps 12 through 15.
21. Toggle “BLOOD/BEADS” key to BEADS.
22. Prepare the Bead solution.
    a. Place 2mL of diluent in a clean container.
    b. Add 15 drops of 7.00 µ beads and mix well.
23. Run the Beads three times and record the Mean Channel for 90^{o} and 90^{o}D on each run. Verify that 0^{o} and 10^{o} Mean Channels are 35+/-3 and 65+/-5 respectively and all CVs are within specification on each run.
24. Compute the average Mean Beads Channel for 90^{o} and 90^{o}D for the three runs.

    NOTE: These Beads Channel locations are now specific to this analyzer and must be entered into the AUTO GAIN table.
25. Press
    - **RETURN**
    - **RETURN**
26. Press
    - **MORE**
    - **GAIN ADJUSTMNTS**
27. Press
    - **AUTO GAIN ADJUSTMNT**
    - **WBC GAINS**
28. Enter the Beads Channel numbers for 90^{o} and 90^{o}D.
29. Run an Auto Gain using Beads to enter these channel locations into the default table.
30. Reboot system on a Setup Disk. Perform a “GET” to store these values.

VP-25 NOC Gain Adjustment

The NOC gains are not calibrated with beads because the 0^{o} and 10^{o} channels are used for both WOC and NOC counting. However, the NOC gains must be higher than those used for WOC by a factor of 1.5. In this procedure, we simply multiply the WOC 0^{o} and 10^{o} gains by 1.5 and change the NOC 0^{o} and 10^{o} setpoints to the new values.

Required Tools & Materials:

- None

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **F12**
   - **F1**
2. Press
   - **SET POINT ENTRY**
3. Move the cursor to the NOC 0^{o} setpoint.
4. Multiply the displayed WOC 0^{o} setpoint by 1.5, change the NOC 0^{o} setpoint to the new calculated value, and press
   - **ENTER**
5. Move the cursor to the NOC 10^{o} setpoint.
6. Multiply the displayed WOC 10^{o} setpoint by 1.5, change the NOC 10^{o} setpoint to the new calculated value, and press
   - **ENTER**
7. If necessary, move the cursor to the NOC Lo threshold, change it to 400, and press
   - **ENTER**
8. Press
   - **SET ANALYZER**

   to store the new values.
9. Press
   - **RETURN**
   - **RETURN**

VP-26 RBC/PLT 0° Gain Verification/Adjustment

The following procedure verifies and, if necessary, adjusts the gain of the RBC/PLT 0^{o} channel using Beads spheres as a reference material.

Required Tools & Materials

- 7.00 µ Diameter Beads, PN 1606004
- CELL-DYN 3200 Diluent/Sheath
- Red-Top Vacutainer
- Transfer Pipette

Verification/Adjustment Procedure:

1. Prepare the 7.00 µ beads solution:
   a. Mix the 7.00 µ beads by shaking vigorously.
   b. Add 15 drops of 7.00 µ beads to a vacutainer.
   c. Add 2 ml of 3200 Diluent/Sheath reagent.
2. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **GAIN ADJUSTMNTS**
3. Press
   - **VERIFY GAINS**
   - **RBC/PLT 0^{O} GAIN**

4. If necessary, change the Mean Channel Number to the desired value and press
   - **ENTER**
5. Place Beads solution under probe, press
   - **START**

   and press the “START SWITCH” to aspirate Beads and run a count cycle.
6. If the Mean Channel Number is within specifications (180 +/- 1), skip steps 7 through 12.
7. Press
   - **RETURN**

   to access “AUTO GAIN ADJUSTMNT.”
8. Press
   - **AUTO GAIN ADJUSTMNT**
   - **RBC/PLT 0^{O} GAIN**
9. If necessary, change the Mean Channel Number to the desired value and press
   - **ENTER**

   NOTE: You must run Beads twice in order to set gain. The first run is needed to calculate new setting, and the second is to verify the setting.
10. Place Beads solution under probe, press
    - **START**

    and press the “START SWITCH” to aspirate Beads and run a count cycle.
11. Place Beads solution under probe and press “START SWITCH” to aspirate Beads and run a count cycle to verify.
12. Press
    - **Y**
    - **ENTER**

    to save new gain setting.

VP-27 RBC/PLT 10° Gain Verification/Adjustment

The following procedure verifies and, if necessary, adjusts the gain of the RBC/PLT 10^{O} channel using Beads spheres as a reference material.

Required Tools & Materials:

- 3.29 or 3.31 Beads, PN 1606005
- CELL-DYN 3200 Diluent/Sheath
- Red-Top Vacutainer®
- Transfer Pipette

Verification/Adjustment Procedure:

1. Prepare the 3.29 or 3.31 Beads solution.
   a. Mix the Beads by shaking vigorously.
   b. Add 10 drops of Beads and 20 drops of diluent to a vacutainer and mix well.

2. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **GAIN ADJUSTMNTS**
3. Press
   - **VERIFY GAINS**
   - **RBC/PLT 10^O GAIN**
4. If necessary, change the Mean Channel Number to the desired value and press
   - **ENTER**
5. Place Beads solution under probe, press
   - **START**

   and press the “START SWITCH” to aspirate Beads and run a count cycle.
6. If the Mean Channel Number is within specifications channel (120 +/- 1 for 3.29 or 121+/- 1 for 3.31), skip steps 7 through 12.
7. Press
   - **RETURN**

   to access “AUTO GAIN ADJUSTMNT.”
8. Press
   - **AUTO GAIN ADJUSTMNT**
   - **RBC/PLT 10^O GAIN.”**
9. If necessary, change the Mean Channel Number to the desired value and press
   - **ENTER**

   NOTE: You must run Beads twice in order to set gain. The first run is needed to calculate new setting, and the second is to verify the setting.
10. Place Beads solution under probe, press
    - **START**

    and press the “START SWITCH” to aspirate Beads and run a count cycle.
11. Place Beads solution under probe and press “START SWITCH” to aspirate Beads and run a count cycle to verify.
12. Press
    - **Y**
    - **ENTER**

    to save new gain setting.

VP-28 MAM 0° & 10° Log Amplifier Verification

The following procedure verifies the dynamic range of the 0^o and 10^o log amplifiers on the MAM by running the 3 Beads and calculating the ratio of the peak channels of the three sizes.

The CELL-DYN 3200 uses the 0^o channel for and MCV, and the 10^o channel for RBCs, PLTs, and MPV, with the log amplifiers used for both outputs. The 0^o channel gain is set with 7.00 µ beads by placing the peak channel in 180 +/- 1, and the lower range is verified with a ratio to a 4.99 RBC 0^o Bead peak channel number. The 10^0 gain is set with 3.31 or 3.29 Beads by placing the 3.29 peak channel in 120 +/- 1 or the 3.31 peak channel in 121 +/- 1, and the upper range is verified with a ratio to a 7.00 µ beads RBC 10^o peak channel number.

The following table and equations are an example of a typical RBC and PLT verification/adjustment.

Table 5-5 0^o & 10^o Log Amplifier Verification

Beads	RBC 0^o P.C.	RBC 10^o P.C.	PLT 0^o P.C.	PLT 10^o P.C.
3.29	N/A	N/A	N/A	Set at 120
4.99	Falls at 129	N/A	N/A	N/A
7.00	Set at 180	Falls at 200	N/A	N/A

0^o Equation:

$$\frac{\text{7.00 RBC } 0^o \text{ P.C.}}{\text{4.99 RBC } 0^o \text{ P.C.}} = \mathbf{1.40 \pm 0.04} \qquad \frac{180}{129} = 1.39 \text{ (within spec)}$$

10^o Equation:

$$\frac{\text{7.00 RBC } 10^o \text{ P.C.}}{\text{3.xx PLT } 10^o \text{ P.C.}} = \mathbf{1.67 \pm 0.04} \qquad \frac{200}{120} = 1.66 \text{ (within spec)}$$

Required Tools & Materials:

- 7.00 µ Diameter Beads, PN 1606004
- 3.29 or 3.31 µ Beads, PN 1606005
- 4.99 µ Beads, PN 1606003
- CELL-DYN 3200 Diluent/Sheath
- Red-Top Vacutainer
- Transfer Pipette

Verification/Adjustment Procedure:

1. Prepare the 7.00 µ beads solution:
   a. Mix the 7.00 µ beads by shaking vigorously.
   b. Add 15 drops of 7.00 µ beads to a vacutainer.
   c. Add 2 ml of 3200 Diluent/Sheath reagent.
2. In the “RUN” menu, press
   - **SPECIMEN TYPE**
   - **BEADS**
   - **RETURN.”**
3. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **RBC DATA**
4. ***Turn smoothing off***, place Beads solution under probe, and press the “START SWITCH” to aspirate Beads and run a count cycle.
5. When cycle is completed, view “RBC 0 DATA” and “RBC 0 HISTOGRAM”, and verify the peak is in channel 180 +/- 1 channel. If the RBC 0^o peak channel number is within specifications, record the RBC 0^o and RBC 10^o peak channel numbers, and skip step 6.
6. Perform RBC/PLT 0^o Gain Verification/Adjustment (VP-26), and repeat steps 3 through 5.
7. Prepare the 4.99 µ beads solution:
   a. Mix the 4.99 µ beads by shaking vigorously.

b. Add 15 drops of 4.99 µ beads to a vacutainer.

8. Place the Beads under probe, and press the “START SWITCH” to aspirate Beads and run a count cycle.

9. When cycle is completed, view “RBC 0 DATA” and “RBC 0 HISTOGRAM” and record the RBC 0^{o} peak channel number

10. Prepare the 3.29 or 3.31 Beads solution:
    a. Mix the Beads by shaking vigorously.
    b. Add 10 drops of Beads and 20 drops of diluent to a vacutainer and mix well.

11. Press
    - **DIAGNOSTICS**
    - **PLT DATA**
    - **PLT 10 DATA.”**

12. ***Turn smoothing off***, place Beads solution under probe, and press the “START SWITCH” to aspirate Beads and run a count cycle.

13. When cycle is completed, view “PLT 10 DATA” and “PLT 10 HISTOGRAM”, and verify the peak is in channel (120 +/- 1 for 3.29 or 121+/- 1 for 3.31). If the PLT 10^{o} peak channel number is within specifications, record the PLT 10 peak channel number, and skip step 14.

14. Perform RBC/PLT 10^{o} Gain Verification/Adjustment (VP-27), and repeat steps 12 and 13.

15. Plug the appropriate 0^{o} peak channel numbers into the following equation, and calculate the 0^{o} log amplifier ratio. If the ratio is out-of-specifications, the 0^{o} log amplifiers must be adjusted (VP-29) or the MAM must be replaced.:

    0^{o} Equation:

    $$\frac{\text{7.00 RBC } 0^{o} \text{ P.C.}}{\text{4.99 RBC } 0^{o} \text{ P.C.}} = 1.40 \pm 0.04$$

16. Plug the appropriate 10^{o} peak channel numbers into the following equation, and calculate the 10^{o} log amplifier ratio. If the ratio is out-of-specifications, the 10^{o} log amplifiers must be adjusted (VP-30) or the MAM must be replaced.

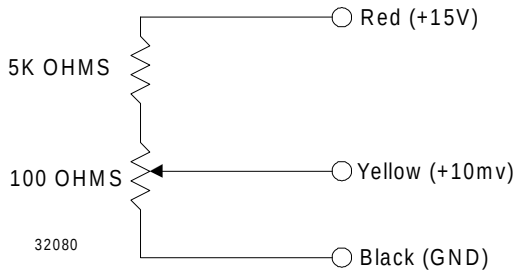
    10^{o} Equation:

    $$\frac{\text{7.00 RBC}10^{o} \text{ P.C.}}{\text{3.xx PLT}10^{o} \text{ P.C.}} = 1.67 \pm 0.04$$

VP-29 0° MAM Log Amplifier Verification/Adjustment

The following procedure verifies and, if necessary, adjusts the 0^o log amplifier gains and offsets on the MAM. Refer to Figure 5-6. A voltage-divider is used to inject a 10mv reference voltage into the 0^o log amplifier, and gains and offsets are adjusted to provide the initial setup of the 0^o log amplifier chain.

Figure 5-6 Voltage-Divider Fixture



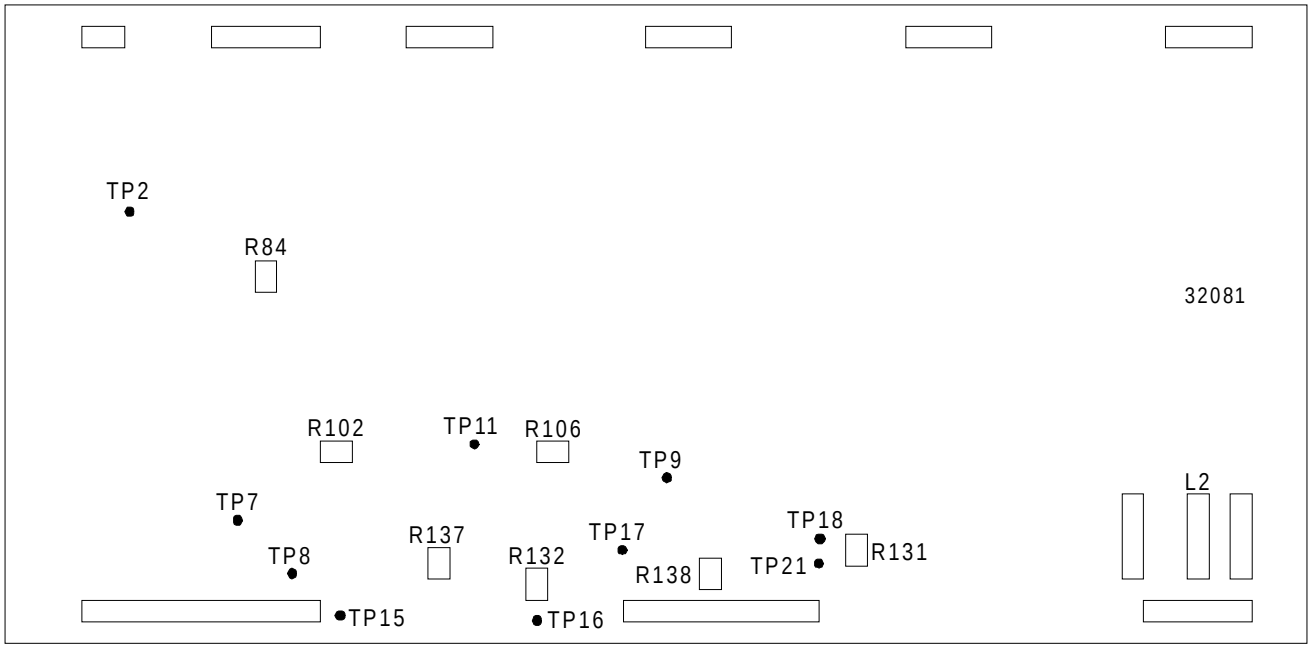
Required Tools & Materials:

- Voltage-Divider Fixture, PN 9450202
- Digital Voltmeter
- Potentiometer Adjustment Tool or Small Slotted Screwdriver

Verification/Adjustment Procedure:

1. Refer to Figure 5-6. Install the fixture on the MAM by attaching the red lead to the top of L2, black lead to TP7, and the yellow lead to TP8.
2. Attach the positive lead of the DVM to TP8 and the negative lead to TP7.
3. Adjust the pot on the fixture for a reading of +10.0mv +/- 0.2mv.
4. Move the positive lead to TP11, and adjust R102 for -23.0mv +/- 0.2mv

Figure 5-7 MAM Test Points & Potentiometers



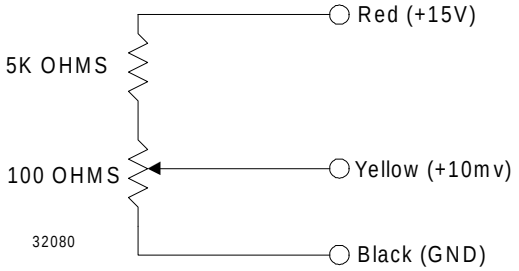
5. Move the positive lead to TP15, and adjust R132 for -1.000V +/- 0.010V.
6. Move the positive lead to TP16, and adjust R137 for 3.68V +/- 0.010V.
7. Leave meter as is, and adjust R132 for a reading of 1.72V +/- 0.010V.

   NOTE: After performing this procedure the 0^{o} gain must be verified/adjusted with Beads (VP-26).

VP-30 10° MAM Log Amplifier Verification/Adjustment

The following procedure verifies and, if necessary, adjusts the 10^{o} log amplifier gains and offsets on the MAM. Refer to Figure 5-8. A voltage-divider is used to inject a 10mv reference voltage into the 0^{o} log amplifier, and gains and offsets are adjusted to provide the initial setup of the 10^{o} log amplifier chain.

Figure 5-8 Voltage-Divider Fixture



Required Tools & Materials:

- Voltage-Divider Fixture, PN 9450202
- Digital Voltmeter
- Potentiometer Adjustment Tool or Small Slotted Screwdriver

Verification/Adjustment Procedure:

1. Refer to Figure 5-6. Install the fixture on the MAM by attaching the red lead to the top of L2, black lead to TP7, and the yellow lead to TP17
2. Attach the positive lead of the DVM to TP17 and the negative lead to TP7.
3. Adjust the pot on the fixture for a reading of +10.0mv +/- 0.2mv.
4. Move the positive lead to TP18, and adjust R106 for -10.0mv +/- 0.2mv
5. Move the positive lead to TP21, and adjust R131 for -1.000V +/- 0.010V.
6. Move the positive lead to TP9, and adjust R138 for 4.20V +/- 0.010V.
7. Leave meter as is, and adjust R131 for a reading of 0.750V +/- 0.010V.

   NOTE: After performing this procedure the 10^{o} gain must be verified/adjusted with Beads (VP-27).

VP-31 Aspirate/Vent Needle Verification

Required Tools & Materials:

- None

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **TOWER TEST**
2. Press
   - **NEEDLE DOWN**
3. Verify that the needle moves down smoothly without any stopping or jerking. Also verify that the GS1 sensor status displays the following:

   GS1 UP:SENSOR STATUS

GS1=1

GS1 DOWN:SENSOR STATUS

GS1=0

4. Press
   - **NEEDLE UP**
5. Verify that the needle moves up smoothly without any stopping or jerking.

VP-32 GS2 Stop Solenoid Verification

Required Tools & Materials:

- None

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **TOWER TEST**
2. Alternately press “Retract Solenoid” and “Extend Solenoid.”
3. Verify that the GS1 solenoid retracts and extends smoothly and fully with each command. Also verify that LED DS1 on SHM1 is on with the retract command and off with the extend command.

VP-33 Bar Code Spin Assembly Verification

Required Tools & Materials:

- None

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **TOWER TEST**
2. Place a tube at the read station, and press
   - **SPIN MOTOR**
3. Verify that the tube is spun smoothly without any stopping or jerking.
4. Press
   - **STOP MOTOR**

   to return to “DIAGNOSTICS.”

VP-34 Tube Height Sensors (S1/S2) Verification

This diagnostic routine first moves GS1 and GS2 down and then up in the same manner as a count cycle. It then displays the status of sensors GS1, S1, and S2 in both the up and down positions (1=sensor blocked, 0=sensor unblocked). It also displays the type of tube sensed at the aspirate position: BD, SST, or No Tube.

Required Tools & Materials:

- BD Specimen Tube
- Sarstedt Specimen Tube

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **TOWER TEST**
2. Place the appropriate tube at the vent/aspirate position.
3. Press
   - **SENSOR TEST**
   - **GS1 DOWN**
4. Verify the following sensor status and tube type for each tube condition.

BD Tube Example:

GS1 UP: Sensor Status

GS1=1 S1=0 S2=0

GS1 Down: Sensor Status Tube Type

GS1=0 S1=1 S2=0BD

Sarstedt Tube Example:

GS1 UP: Sensor Status

GS1=1 S1=0 S2=0

GS1 Down: Sensor Status Tube Type

GS1=0 S1=1 S2=1SST

No Tube Example:

GS1 UP: Sensor Status

GS1=1 S1=0 S2=0

GS1 Down: Sensor Status Tube Type

GS1=0 S1=0 S2=1 No Tube

VP-35 Mixer Up/Down Verification

Required Tools & Materials:

- None

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **LOADER TEST**
2. Alternately press “MIXER DOWN” and “MIXER UP” and verify that the assembly moves up and down smoothly without any stopping or jerking. Also verify that the home sensor is “1” when up and “0” when down.

VP-36 Mixer Head Rotation Verification

Required Tools & Materials:

- None

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **LOADER TEST**
2. Alternately press “ROTATE MIX UP” and “ROTATE MIX DOWN” and verify that the mixer head rotates up and down smoothly without any stopping or jerking. Also verify that the home sensor is “0” when up and “1” when down.

VP-37 Mixer Bladders Verification

Required Tools & Materials:

- None

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **LOADER TEST**
2. Press
   - **CYCLE BLADDERS**
3. Alternately press “GRIP TUBE” and “RELEASE TUBE” and verify that the mixer bladders inflate and deflate completely, and that there are no pressure or vacuum leaks.

VP-38 Rack Advance & Tube Sensors Verification

Required Tools & Materials:

- Specimen Tubes
- Specimen Loader Rack

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **LOADER TEST**
2. Place a rack with alternating tubes at the load side rear wall.
3. Press
   - **START RACK ADVANCE**
4. Verify that the rack indexes smoothly through the processing station without any stopping or jerking during index movements.
5. Verify that when a tube is present at a sensor position a “1” is indicated, and when a tube is not present a “0” is indicated.

VP-39 Cross Transfer Arms & Rack Sensors Verification

Required Tools & Materials:

- 5 Racks

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **LOADER TEST**
2. Leave the load side and unload side empty, and alternately press “EXTEND ARMS” and “RETRACT ARMS.”
3. Verify that the arms extend and retract smoothly without any stopping or jerking.
4. Place one rack in the load side, leave unload side empty, and press
   - **EXTEND ARMS**

   Verify the following sensor status, and press
   - **RETRACT ARMS**

   SENSOR STATUS

   EXTEND ARMS:LOAD SENSOR = 0

   UNLOAD FULL = 0

   UNLOAD WARN = 0
5. Remove rack from the load side, place five racks in the unload side, and press
   - **EXTEND ARMS**

   Verify the following sensor status, and press “RETRACT ARMS.”

   SENSOR STATUS

   EXTEND ARMS:LOAD SENSOR = 1

   UNLOAD FULL = 1

   UNLOAD WARN = 1

VP-40 Rack Bar Code Labels Verification

Required Tools & Materials:

- 5 Racks

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **VER RACK BAR CODE**
2. Manually move a rack through the processing station, positioning the rack and tube position bar code labels at the slot in the processing station.
3. Verify that the bar code number on the screen matches the number on the rack.

VP-41 Mixer Bladders Pressure Verification/Adjustment

Required Tools & Materials:

- Pressure Gauge
- Slotted Screwdriver

Verification/Adjustment Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **VOLTAGE READINGS**
2. Verify “Press 1 psi” is 12.5-13.5 psi. If out-of-range, perform Vacuum & Pressure Level Verification/Adjustment (VP-16).
3. Press
   - **MORE**
   - **LOADER TEST**
4. Press
   - **CYCLE BLADDERS**
5. Remove tubing from vacuum/pressure port on mixer head, and connect tubing to pressure gauge.
6. Press
   - **GRIP TUBE**

   to apply pressure.
7. Adjust pressure regulator (just to right of load side empty sensor) for 6.5 psi +/- 0.2 psi.
8. Reconnect tubing to vacuum/pressure port.

VP-42 Shear Valve Driver Lubrication Procedure

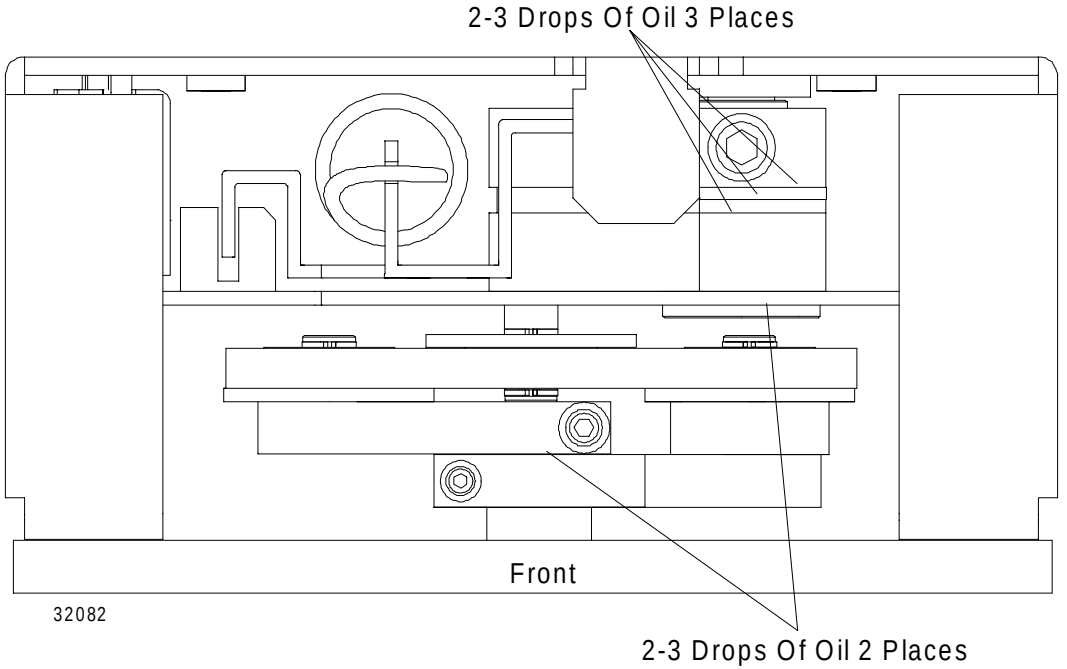
Required Tools & Materials:

- Oil PN 14237-015 (Dallas/Europe), 1605806 (Santa Clara)

Verification Procedure:

1. Power off instrument using the proper shutdown procedure.
2. Remove the shear valve driver from the Analyzer.
3. Lubricate the assembly as shown in Figure 5-9.
4. Re-install the shear valve driver and verify instrument performance.

Figure 5-9 Shear Valve Driver Lubrication Points



VP-43 Optics Bench Cleaning Procedure

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

Required Tools & Materials:

- Cotton Swabs
- High Grade Lens Paper (Kodak recommended - DO NOT USE Baxter S/P, as it may scratch the lens.)
- Canned Air - Optics Grade

Verification Procedure:

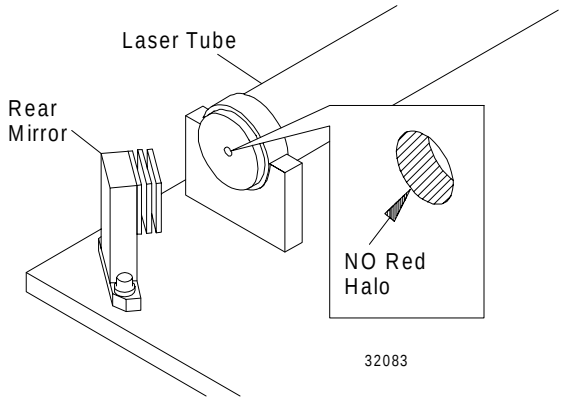
1. Clean the left side and rear fan filters.
2. Remove Analyzer top cover and plastic optics covers.
3. Close Laser Shutter.
4. Using pressurized air, remove dust and dirt from optics bench and surrounding area.

5. Using Kodak lens paper on the end of a cotton swab, clean rear mirror, cylindrical lens, front mirror, imaging lens, and flow cell.

CAUTION: Do not use lens cleaning solution on mirrors. If cleaning fluid is needed, use reagent grade methanol only.

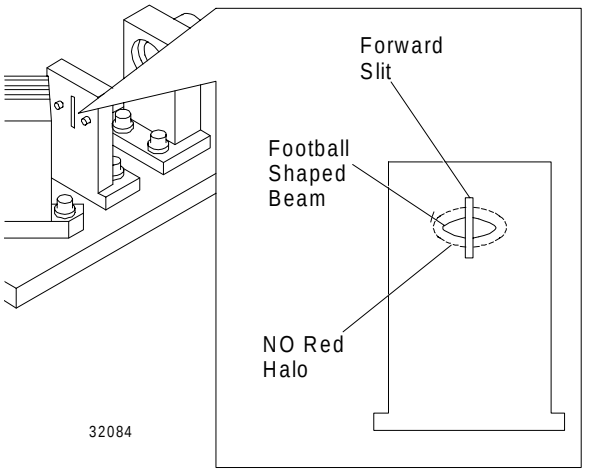
6. Repeat cleaning process to ensure all residual particles are removed.
7. Open Laser Shutter.
8. With laser on, check for a red glow or halo around opening where laser beam exits the laser tube. Refer to Figure 5-10.

Figure 5-10 Laser Output Halo



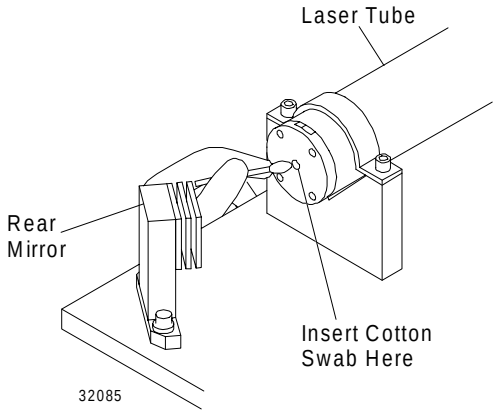
9. Check for a red glow or halo around the forward slit. If laser output lens dirty, a halo will appear around football shaped laser beam. Refer to Figure 5-11.

Figure 5-11 Forward Slit Halo



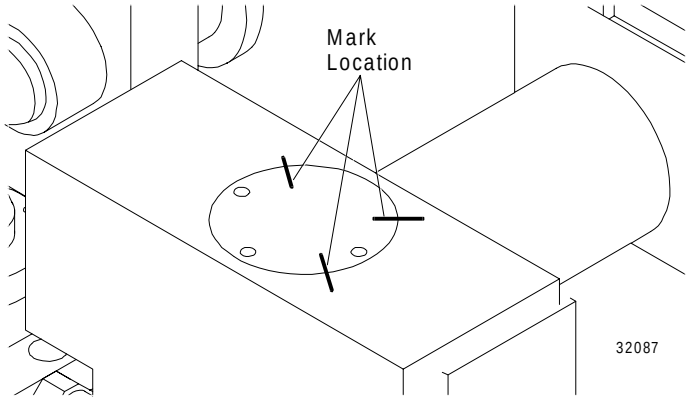
10. If halo exists in either location, clean laser with dry cotton swab, or use lens paper. Refer to Figure 5-12.

Figure 5-12 Laser Tube Cleaning



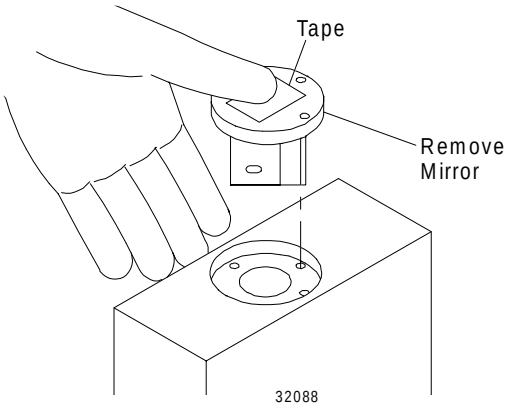
11. Close Laser Shutter.
12. Clean 10^{o} mirror.
    a. Mark position of mirror and housing with pencil. Refer to Figure 5-13.

Figure 5-13 Mark Mirror Positions



b. Remove screws and mirror. Refer to Figure 5-14.

Figure 5-14 Mirror Removal



c. Clean mirror using reagent grade methanol or microscope lens cleaning solution (green) and high grade lens paper. (Kodak recommended - DO NOT USE Baxter S/P). Ensure surface is clean; use compressed air to remove any remaining lint.

d. Replace mirror and align marks. DO NOT tighten screws.

e. Open Laser Shutter.

13. Use the following procedure to adjust the mirror for maximum 10^{o} mean.

a. Prepare the WBC Beads solution by placing 2 mL of diluent in a clean container, adding 15 drops of 7.00 µ beads, and mixing well.

b. From Main Menu, press

- **DIAGNOSTICS**
- **MORE**
- **WBC DATA**

c. Place the 7.00 µ beads solution under the probe, and press

- **EXTENDED WBC**
- **COUNT**
- **START**

to aspirate the Beads and start the cycle.

d. Observe the 10^{o} mean, and rotate the mirror for the highest 10^{o} mean reading.

e. Tighten mirror screws ensuring maximum reading is maintained, and erase pencil marks.

14. Perform WBC Gain Verification/Adjustment (VP-23).

15. Perform NOC Gain Adjustment (VP-25).

16. Perform RBC/PLT 0^{o} Gain Verification/Adjustment (VP-26).

17. Perform RBC/PLT 10^{o} Gain Verification/Adjustment (VP-27).

VP-44 Optical Flow Cell Cleaning & De-Bubble Procedure

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

Required Tools & Materials:

- 20% Bleach or Abbott, ISE Conditioning Solution LN1360-02
- 10 mL Syringe
- Needle Nosed Pliers

Verification Procedure:

1. Fill syringe with 20% bleach solution or ISE Cleaning Solution.
2. From Main Menu, press
   - **SPECIAL PROTOCOLS**
   - **EMPTY/FILL FLOW CELL**
   - **EMPTY FLOW CELL**

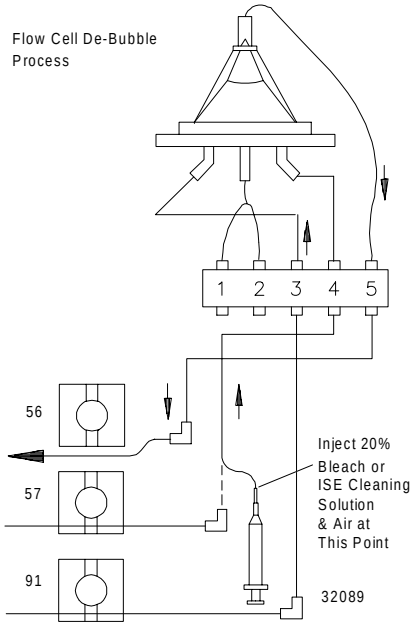
3. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **SOLENOID OPERATION**
4. To open solenoid 56, press
   - **STEP SOLENOID**

     type ***56***, and press
   - **ENTER**
5. Refer to Figure 5-15. Remove elbow from right side of solenoid 57, and connect elbow to syringe.
6. Inject bleach or cleaning solution in short strokes to create turbulent motion in flow cell.
7. Let solution remain is flow cell for three to five minutes.

CAUTION: Do not allow ISE cleaning solution to remain in flow cell for over five minutes.

8. Disconnect syringe, and connect reconnect elbow to solenoid 57.
9. Initialize and prime instrument, and run three background counts.
10. Verify that background counts are within specifications: WBC ≤ 0.10 K/µL, RBC ≤ 0.02 M/µL, and PLT ≤ 5 K/µL.
11. Refer to Figure 5-15. Verify that there are no large bubbles in the flow cell. If large bubbles are present, perform Optical Flow Cell Wetting Procedure (VP-43).

Figure 5-15 Flow Cell Cleaning Plumbing



VP-45 Optical Flow Cell Wetting Procedure

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

Required Tools & Materials:

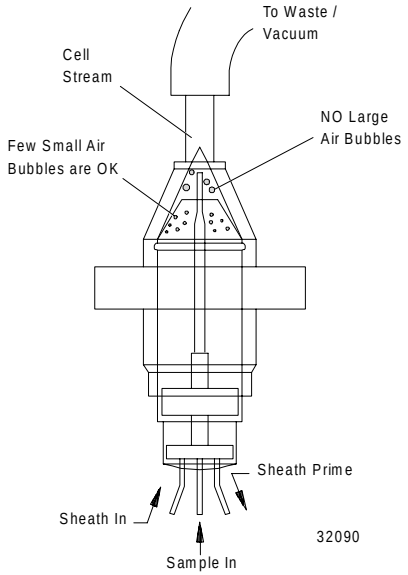
- CN Free HGB/NOC Lyse
- 10 mL Syringe

Verification Procedure:

1. Fill syringe with HGB lyse solution.
2. From Main Menu, press
   - **SPECIAL PROTOCOLS**
   - **EMPTY/FILL FLOW CELL**
   - **EMPTY FLOW CELL**
3. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **SOLENOID OPERATION**
4. To open solenoid 56, press
   - **STEP SOLENOID**

     type ***56***, and press
   - **ENTER**
5. Refer to Figure 5-15. Remove elbow from right side of solenoid 57, and connect elbow to syringe.
6. Inject HGB lyse reagent in short strokes to create turbulent motion in flow cell.
7. Let lyse remain is flow cell for three to five minutes.
8. Disconnect syringe, and connect reconnect elbow to solenoid 57.
9. Initialize and prime instrument, and run three background counts.
10. Verify that background counts are within specifications: WBC ≤ 0.10 K/µL, RBC ≤ 0.02 M/µL, and PLT ≤ 5 K/µL.
11. Refer to Figure 5-16. Verify that there are no large bubbles in the flow cell. If large bubbles are present, repeat this procedure.

Figure 5-16 Flow Cell Bubbles



VP-46 Laser Power Output Verification

DANGER: LASER LIGHT Avoid direct exposure to laser beam. Refer to Introduction Section 1.7 for detailed safety information.

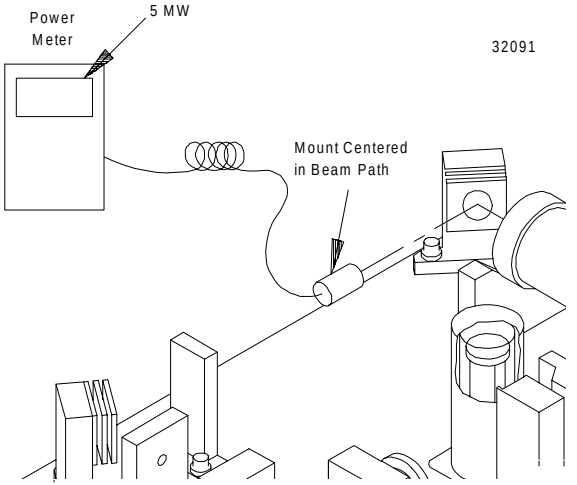
Required Tools & Materials:

- Laser Power Meter
- Optical Alignment Tool Kit, PN 8921183801

Verification Procedure:

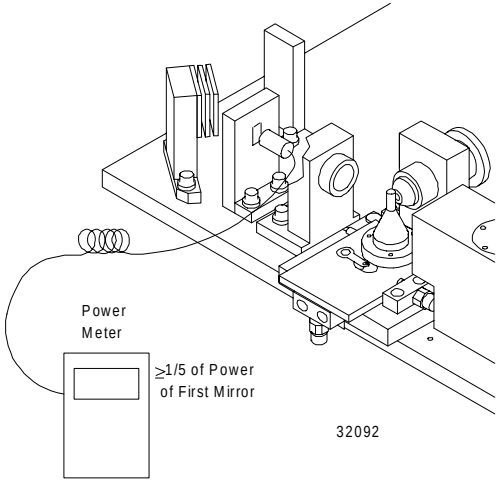
1. Ensure laser has been on for at least 15 minutes.
2. Perform Optics Bench Cleaning Procedure (VP-43).
3. Refer to Figure 5-17. Check laser power after first mirror:
   a. Mount power meter photodiode centered in beam path.
   b. Verify that power is 5 mW or greater.
   c. If power is less than 5 mW, replace laser tube.

Figure 5-17 Laser Output Power Check



4. Refer to Figure 5-18. Check laser power after forward slit:
   a. Mount power meter photodiode centered in beam path between forward slit and imaging lens.
   b. Power meter should read at least 1/5 of that obtained in step 3.
5. Perform Optical Offsets Verification (VP-47).

Figure 5-18 Laser Power At Forward Slit



VP-47 Optical Offsets Verification

Required Tools & Materials:

- Optical Alignment Tool Kit, PN 8921183801

Verification Procedure:

1. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **VOLTAGE READINGS**
2. Ensure top cover is in place, or cover optics bench with black cloth.
3. Verify that CH 1 through CH4 Offsets are less than 1.00 volt.
4. If any are greater than 1.00 volts, perform Optics Bench Cleaning Procedure (VP-43).

VP-48 Shear Valve Cleaning Procedure

Required Tools & Materials:

- DI Water
- Clean Container
- Lint Free Wipes

Verification Procedure:

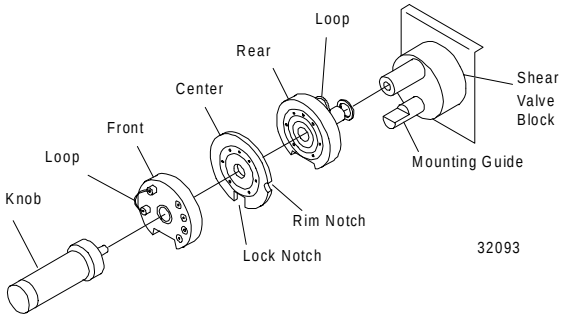
1. From Main Menu, press
   - **SPECIAL PROTOCOLS**
   - **CLEAN/RES SHEAR VAL**
   - **CLEAN SHEAR VAL**
2. Refer to Figure 5-19. Unscrew shear valve knob.

CAUTION: Do not drop center ceramic section.

3. Remove three ceramic sections from shear valve driver leaving tubing in place, and place center ceramic piece in a container of DI water.
4. Use damp lint free wipes to clean front and rear surfaces of front and rear ceramic sections.

5. Clean center mounting holes in front and rear ceramic sections.

Figure 5-19 Shear Valve Disassembly



6. Clean mounting guide and lock notches in each ceramic section.
7. Using a flashlight, inspect ports on front and rear ceramic sections, and ensure no foreign material blocks ports.
8. Remove center section from DI water, and clean both sides to remove any blood or foreign material.
9. Wet all surfaces with DI water and assemble as shown in Figure 5-19. Ensure wide notches are down and rim notch on center section is to the right.
10. Tighten shear valve knob until it stops.
11. Press
    - **RESTORE SHEAR VAL**
12. Run background counts until all are within specifications: WBC ≤ 0.10 K/µL, RBC ≤ 0.02 M/µL, and PLT ≤ 5 K/µL.

VP-49 HGB Flow Cell Cleaning Procedure

This procedure first uses the Auto Clean routine to clean the flow cell, and if that is unsuccessful a manual procedure is used.

Required Tools & Materials:

- CELL-DYN Enzymatic Cleaner
- 20% Bleach Solution
- 20 mL Syringe

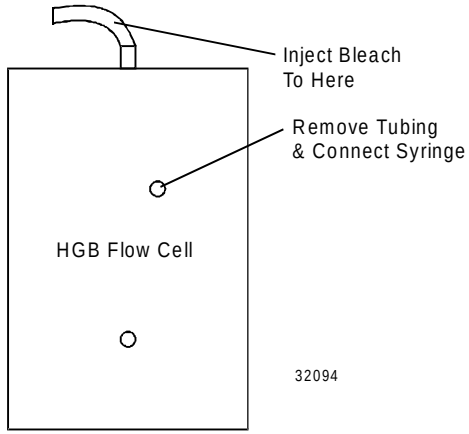
Verification Procedure:

1. From Main Menu, press
    - **SPECIAL PROTOCOLS**
    - **MORE**
    - **AUTO CLEAN**

    Follow the on-screen instructions to perform the procedure.
2. Run three background counts to purge enzyme cleaner.
3. From Main Menu, press
    - **DIAGNOSTICS**
    - **MORE**
    - **VOLTAGE READINGS**
4. Verify that the “HGB OUTPUT” voltage is 5.00 volts +0.2/-0.00 volts. If the voltage is within range, skip steps 5 through 13.
5. Manually open solenoid 93 to drain liquid from flow cell.

6. Prepare and aspirate 20% bleach solution into syringe.
7. Refer to Figure 5-20. Remove tubing from port and connect syringe to port.
8. Inject bleach solution until it can be seen exiting top port, and let remain in flow cell for five to ten minutes.
9. Manually open solenoid 93 to drain bleach from flow cell.
10. Remove syringe, and connect tubing to port.
11. Run three background counts to purge bleach.

Figure 5-20 HGB Flow Cell Plumbing



12. From Main Menu, press
    - **DIAGNOSTICS**
    - **MORE**
    - **VOLTAGE READINGS**
13. Verify that the “HGB OUTPUT” voltage is 5.00 volts +0.2/-0.00 volts. If voltage is slightly out-of-range, perform HGB Current Verification/Adjustment (VP-5).

VP-50 Open Mode Aspiration Path Cleaning Procedure

WARNING: POTENTIAL BIOHAZARD The aspiration needle/probe are sharp and potentially contaminated with infectious materials. Avoid contact with the tips of the needle/probe.

Required Tools & Materials:

- CELL-DYN Enzymatic Cleaner
- Specimen Tubes
- Wire Stylet, Gauge #23
- Lint Free Tissues
- Diluent

Verification Procedure:

1. In the “RUN” mode use “CHANGE SAMPLER” to select “OPEN SAMPLER.”
2. Manually open solenoid 12 to purge liquid from plumbing.
3. Remove tubing from top of open probe.
4. Place a tissue under probe, run stylet into the top of probe until it extends out the bottom, and wipe any material from stylet. Run up and down several times and remove.

5. Clean outside of probe several times with tissue dampened with Enzymatic Cleaner, and reconnect tubing to top.
6. Place a tube containing 4 mL of Enzymatic Cleaner under probe, manually open solenoid 12, and close when Enzymatic Cleaner passes through solenoid 12.
7. Let Enzymatic Cleaner remain for five minutes, and manually open 12 until plumbing is emptied.
8. Place a tube filled with diluent under probe, and open 12 until tube is emptied to flush plumbing.
9. Run background counts until all are within specifications: WBC ≤ 0.10 K/µ L, RBC ≤ 0.02 M/µ L, and PLT ≤ 5 K/µL.

VP-51 Closed Mode Aspiration Path Cleaning Procedure

Required Tools & Materials:

- CELL-DYN Enzymatic Cleaner
- Specimen Tubes

Verification Procedure:

1. In the “RUN” mode use “CHANGE SAMPLER” to select “CLOSED SAMPLER.”
2. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **TOWER TEST**
3. Manually open solenoid 12 to purge liquid from plumbing.
4. Place a tube filled with enzyme cleaner at the aspirate position, and press
   - **NEEDLE DOWN**
5. Manually open solenoid 12, and close when enzyme cleaner passes through solenoid 12.
6. Manually hold solenoid 38 closed, and momentarily open solenoid 36 to aspirate enzyme cleaner into vent needle.
7. Let enzyme cleaner remain for five minutes, press
   - **NEEDLE UP**

   and manually open 12 until plumbing is emptied.
8. “Initialize” and “Prime” instrument.
9. Run background counts until all are within specifications: WBC ≤ 0.10 K/µL, RBC ≤ 0.02 M/µL, and PLT ≤ 5 K/µL.

VP-52 Power-Up CPU/DCM 7-Segment LED Verification

Required Tools & Materials:

- None

Verification Procedure:

1. Power-up the system and observe the 7-segment LED on the CPU/DCM. Refer to the following table for status conditions.

   NOTE: After all the tests pass and solenoids energize, “1” and “E” will alternately flash in the display. This is a normal condition and does not indicate a problem.

Table 5-6 CPU/DCM 7-Segment LED Status Conditions

“0”	Indicates system power-up.
“1”	Indicates that the CPU/DCM flash memory failed.
“2”	Indicates that the CPU/DCM first 524K of DRAM failed.
“3”	Indicates that the CPU/DCM second 524K of DRAM failed.
“4”	Indicates that the CPU/DCM third 524K of DRAM failed.
“5”	Indicates that the CPU/DCM fourth 524K of DRAM failed.
“6”	Indicates that all CPU/DCM memory passed.

VP-53 Software Installation Procedure

Required Tools & Materials:

- CELL-DYN System Installation Disks 1 & 2 P.N. 9380590

Verification Procedure:

1. Turn system power off.
2. Insert disk #1 in the floppy drive.
3. Turn system power on.
4. Follow the on-screen instructions to install software.
5. At the **C:\CD3200>** prompt type ***A:INSTALL*** and press
   - **ENTER**
6. When prompted, install disk #2 and follow the on-screen directions.
7. When installation is complete, remove disk #2 and power-down and re-boot instrument.

VP-54 Hard Drive Verification

Required Tools & Materials:

- None

Verification Procedure:

1. In the “MAIN” menu press
   - **F12**
   - **F8**

2. At the **C:\CD3200** prompt, type ***CHKDSK/F*** and press
   - **ENTER**
3. At the selection prompt type ***Y*** and press
   - **ENTER**

   to run CHKDSK/F.

   .

```
1,279,688,704 bytes total disk space
    131,072 bytes in 2 hidden files
  3,178,496 bytes in 97 directories
750,223,360 bytes in 2,215 user files
526,155,776 bytes available on disk

     32, 768 bytes in each allocation unit
     38,053 total allocation units on disk
     16,057 available allocation units on disk

    655,360 total bytes memory
618,560 bytes free                    32095
```

Figure 5-21 CHKDSK Results, Hard Disk

4. If lost allocation units are reported, type ***N*** to delete.
5. The display should closely resemble Figure 5-22. If a line is added saying **"xxxx bytes in bad sectors"** verify that the number of bytes is less than 1% of the total disk space. If the number exceeds 1%, the hard drive is suspect and should probably be replaced.
6. If there are no indications of a defect, type ***rll*** and press "ENTER" to return to the "MAIN" menu.

VP-55 Floppy Drive Verification

Required Tools & Materials:

- None

Verification Procedure:

1. In the "MAIN" menu, press
   - **F12**
   - **F8**
2. At the **C:\CD3200** prompt, type ***A:*** and press
   - **ENTER**
3. At the **A:\>** prompt, type ***CHKDSK/F*** and press
   - **ENTER**
4. At the selection prompt type ***Y*** and press
   - **ENTER**

   to run CHKDSK/F.The display should closely resemble Figure 5-22.
5. If there are no indications of a defect, type ***C:*** and press
   - **ENTER**
6. Then type ***rll*** and press
   - **ENTER**

   to return to the "MAIN" menu.

```
1,457,664 bytes total disk space
  195,072 bytes in 4 user files
1,262,592 bytes available on disk

      512 bytes in each allocation unit
    2,847 total allocation units on disk
    2,466 available allocation units on disk

  655,360 total bytes memory
618,560 bytes free
```

Figure 5-22 Floppy Drive CHKDSK Results

VP-56 Background Counts Verification

Required Tools & Materials:

- None

Verification Procedure:

1. From Main Menu, press
   - **RUN**
   - **SPECIMEN TYPE**
   - **BACKGROUND**
2. Press the “TOUCH PLATE” to run a background count.
3. Verify that the background counts are within specifications according to the following table.

Table 5-7 Background Count Specification

WBC (WOC)	NOC	RBC	HGB	PLT
≤ 0.10 k/µ L	≤ 0.10 k/µL	≤ 0.02 m/µL	≤ 0.1g/dL	≤ 5.0 k/µL

VP-57 System CV Verification

Required Tools & Materials:

- 2.5 mL Fresh Normal Blood

Verification Procedure:

1. From Main Menu, press
   - **RUN**
   - **SPECIMEN TYPE**
2. Move the cursor to an empty file, and press
   - **QC SPECIMEN**
3. Mix the fresh blood thoroughly, and run 10 times in the open mode and 10 times in the closed mode.
4. Press
   - **MAIN**
   - **QUALITY CONTROL**
   - **VIEW QC LOG**
5. Verify the CVs are within specification according to the following table.

Table 5-8 CV Specifications

WBC (WOC)	NOC	RBC	HGB	MCV	PLT	MPV
≤ 2.7%	≤ 2.7%	≤ 1.5%	≤ 1.0%	≤ 1.0%	≤ 4.0%	≤ 5.0%

VP-58 System Calibration Verification/Adjustment

Required Tools & Materials:

- CELL-DYN Calibrator

Verification Procedure:

1. Pre-calibration checks:
   a. Verify reagent type, expiration date, and volumes are at least 1/2 full.
   b. Verify calibrators are not expired.
   c. Ensure background counts are within specifications (VP-56).
   d. Ensure WOC offsets for channels 1 through 4 are less than 1.00 volt.
   e. Verify system precision is within specifications (VP-57).
2. Perform Open Mode Auto Calibration using commercial calibrator only.

   NOTE: If any problems are encountered, refer to "Auto-Cal Procedure-Open Mode" in Chapter 6 of the CELL-DYN 3200 Operations Manual for a complete description of the calibration procedure.

   a. Ensure Analyzer in Open Mode.
   b. From MAIN MENU press
      - **CALIBRATION**
      - **AUTO-CALIBRATE**

      and toggle "F2" to "CALIBRATOR."
   c. Enter the reference values from the assay sheet, pressing [ENTER] after each entry.
   d. Press
      - **START AUTO-CAL**

      to ready the instrument for calibration.
   e. Prepare the calibrator for processing according to the assay sheet.
   f. Run the calibrator 5 times, mixing well between runs.
   g. Press
      - **ACCEPT**

      to enter the new factors for the parameters that need calibration.

VP-59 Vacuum Accumulator #1 Rinsing Procedure

Required Tools & Materials:

- Clean >250 mL Container
- DI Water
- 0.125"ID 0.250"OD Tubing, 1 Foot
- #2 Phillips Screwdriver

Verification Procedure

1. Initialize Analyzer, and remove Left Side Cover.
2. Extend Air Supply out of Analyzer (Vacuum/Pressure Assembly (RR-7)).
3. Measure 250 mL (1 cup) of DI water into a clean container.

CAUTION: Do not place more than stated amount of DI water in container.

4. Refer to Figure 5-23. Pinch tubing at position 7 of manifold, remove tubing from position 4, and attach 0.125"ID 0.250"OD tubing to fitting at position 4.

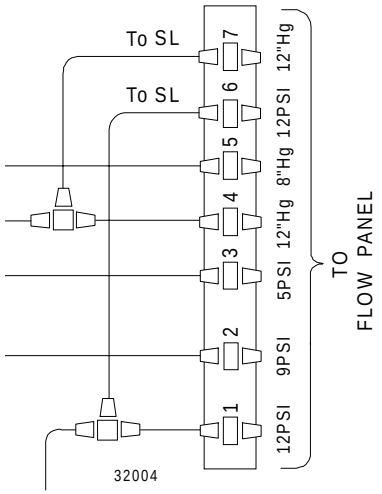


Figure 5-23 Vacuum/Pressure Manifold

5. Place tubing connected to position 4 into container, and allow all DI water to be aspirated into Vacuum Accumulator #1.
6. Remove tubing from position 4, connect original tubing, and unpinch position 7.
7. Wait at least 5 minutes to remove any saline bridges between electrodes.
8. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **DRAIN ACCUMULATORS**
9. Initialize Analyzer and repeat Step 8.

VP-60 Vacuum Accumulator #2 Rinsing Procedure

Required Tools & Materials:

- Clean >250 mL Container
- DI Water
- 0.125"ID 0.250"OD Tubing, 1 Foot
- #2 Phillips Screwdriver

Verification Procedure

1. Initialize Analyzer, and remove Left Side Cover.
2. Extend Air Supply out of Analyzer (Vacuum/Pressure Assembly (RR-7)).

3. Measure 250 mL (1 cup) of DI water into a clean container.

CAUTION: Do not place more than stated amount of DI water in container.

4. Refer to Figure 5-24. Remove tubing from position 5 of manifold, and attach 0.125"ID 0.250"OD tubing to fitting at position 5.
5. Place tubing connected to position 5 into container, and allow all DI water to be aspirated into Vacuum Accumulator #2.
6. Remove tubing from position 5, and connect original tubing.
7. Wait at least 5 minutes to remove any saline bridges between electrodes.
8. From Main Menu, press
   - **DIAGNOSTICS**
   - **MORE**
   - **DRAIN ACCUMULATORS**
9. Initialize Analyzer and repeat Step 8.

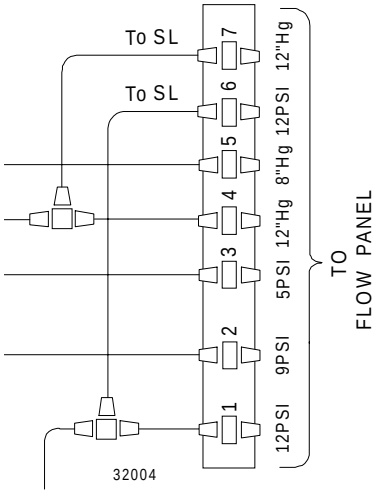


Figure 5-24 Vacuum/Pressure Manifold

VP-61 Hard Drive Formatting

Required Tools & Materials:

CELL-DYN 3200 System Service Disk PN 9380700

Verification Procedure

1. Perform (VP-64) “Backup Procedure” .
2. Turn System OFF.
3. Insert Service Disk into Floppy Drive.
4. Turn System ON.
5. At A:\ prompt type ***CHKDSK/F***, then press
   - **ENTER**

6. If there is any indication that the disk is defective, it should be formatted.
7. Format the hard drive:
   a. Type ***FORMAT C:/S*** and press
      - **ENTER**
   b. The display will indicate when the format is complete
8. Perform (VP-65) Restore Setup

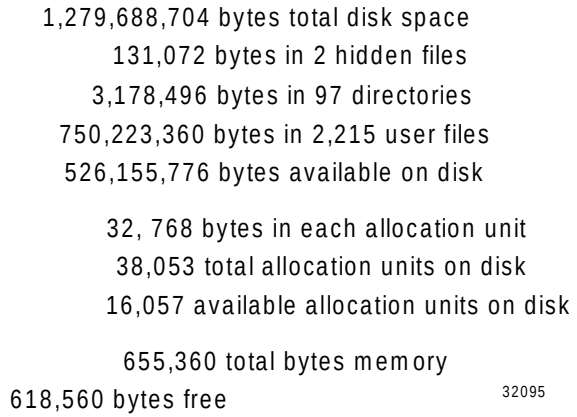

1,279,688,704 bytes total disk space
131,072 bytes in 2 hidden files
3,178,496 bytes in 97 directories
750,223,360 bytes in 2,215 user files
526,155,776 bytes available on disk
32, 768 bytes in each allocation unit
38,053 total allocation units on disk
16,057 available allocation units on disk
655,360 total bytes memory
618,560 bytes free
32095

Figure 5-25 CHKDSK/F Results, Hard Disk

VP-62 DOS Installation

Required Tools & Materials:

Service Disk PN 9380700

Verification Procedure

1. Turn System OFF.
2. Insert Service Disk into Floppy Drive.
3. Turn System ON.
4. At A:\ prompt type ***INSTALL***, then press
   - **ENTER**
5. Remove Service Disk.
6. Turn System OFF, wait 5 seconds, then turn System ON.

VP-63 CS/SL SETUP

Required Tools & Materials:

None

Verification Procedure

1. Enter Diagnostics Hidden Screen
   a. From MAIN MENU, press
      - **DIAGNOSTICS**
   b. Press
      - **F12**
      - **F1**

      TOGGLE CS/SL to appropriate instrument type.

      NOTE: Instrument type will display on screen.
   c. Press
      - **RETURN**

VP-64 Backup Procedure

Required Tools & Materials:

CELL-DYN 3200 System Setup Disk PN 9380595

Verification Procedure

1. Turn System OFF.
2. Insert Setup Disk.
3. Turn System ON.
4. At A:\ prompt, type ***S*** to SAVE, then press
   - **ENTER.**

   This copies Old Version Setup from Hard Drive to Setup Disk.
5. Remove Setup Disk.
6. Turn System OFF, wait 5 seconds, then turn System ON.

VP-65 Restore Setup

Required Tools & Materials:

CELL-DYN 3200 System Setup Disk PN 9380595

Verification Procedure

1. Turn System OFF.
2. Insert Setup Disk.
3. Turn System ON.
4. At A:\ prompt, type ***R*** to RESTORE, then press
   - **ENTER**

   This copies Old Version Setup from Setup Disk to Hard Drive.
5. Remove Setup Disk.
6. Turn System OFF, wait 5 seconds, then turn System ON.

VP-66 List Mode Data Collection

Required Tools & Materials:

None

Verification Procedure

1. Collect Data with List Mode ON.
   a. From MAIN MENU, Press
      - **DIAGNOSTICS**

   b. Press,
      - **F12**
      - **F1**
      - **STORE RAW ON/OFF (To ON)**

   c. Press,
      - **RETURN**

   d. From MAIN Menu, press
      - **RUN**

   e. Run specimens to collect list mode data.

f. Press
   - **MAIN**
   - **DIAGNOSTICS**

g. Press,
   - **F12**
   - **F1**

h. DO NOT run analyzer with List Mode ON for an extended period. Each file = approximately 100kb. When Hard Drive is filled with Data Lists Fatal Fault condition will result. Then files must be deleted.

2. Download List Mode Data to Diskette.
   a. From MAIN MENU, press
      - **F12**
      - **F8**

   b. Type ***CD\RAWFILE\(yymmdd-the DATE OF COLLECTION)***.

   c. Press
      - **ENTER**

   NOTE: Date format is YYMMDD (Year Month Day). Example: 960321 = 21 March 1996.

   d. Place Formatted 1.44mb diskette in Floppy Disk Drive.

   e. Type **COPY C:\RAWFILE\960321\(SEQUENCE#).RAW B:**. This will copy one file of LIST MODE DATA from Data Station to Diskette in Floppy Drive.

   NOTE: Sequence # = Specimen Sequence number in Data Log.

   Example: “COPY C:\RAWFILE\960921\8411.RAW B:”. If multiple files need to be downloaded, use wild cards. Such as sequence # 841?.raw. This will download 8410, 8411, 8412, 8413, etc.

3. If Needed - Delete Data Files from Hard Drive.
   a. At C:\ prompt type ***CD\RAWFILE***, and press
      - **ENTER**

   b. Type ***DIR***, and Press
      - **ENTER**

   to get listing of all files in RAWFILE directory.

   c. Select files to be deleted.

   d. Type ***DEL C:\RAWFILE\(FILE NAME)*** for each file to be deleted.

4. Press
   - **RETURN**

VP-67 Download HSSL Com

Required Tools & Materials

CELL-DYN 3200 System Installation Disks 1 & 2 P.N. 9380590

Verification Procedure

1. Turn system power OFF.
2. Insert disk #1 in the floppy drive.
3. Turn system power ON.
4. When instructed, insert disk #2.

5. Follow on-screen instructions to download HSSL Com and setup CS or SL.
   a. Go to the Main Menu and press F12, F8 to get to the C:\CD3200> prompt.
   b. Type HSSL
   c. If analyzer is an SL, type 0KL <enter>. SKL should be displayed in the left column. Type 0K <enter>. 0K should be displayed in the right column.
   d. If analyzer is a CS, type 0KS <enter>. 0KS should be displayed in the left column. Type 0K <enter>. 0K should be displayed in the right column.

NOTE: 0 = zero

   a. Press F8 to exit to the C:\CD3200> prompt.
   b. Turn off analyzer, wait 5 sec, turn on analyzer to reboot.